ESAWAS REGULATORS ASSOCIATION
Cooperating to promote effective development of water and Sanitation regulation

Training on Sanitation Safety Planning for Regulators

Day 1: Wednesday, September 30th 2023

World Health Organization

seecon

Leonellha Barreto Dillon

- Co-author of the 2022 version of the SSP manual.
- SSP Trainer since 2016.
- Consultant for the implementation of SSPs.

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Who are our participants?

Learning objectives of our workshop

At the end of this training, participants will:

- Understand and appreciate Sanitation Safety Planning.
- Understand the methodology and key steps of Sanitation Safety Planning.
- Know how to use the WHO Sanitary Inspections for Sanitation Systems.
- Identify which are the requirements for successful implementation of SSP.
- Learn about previous action plans to rollout Sanitation Safety Planning (SSP) in the region.
- Be able to communicate about Sanitation Safety Planning to their target audience.

Agenda of our workshop

Day 1: Wednesday, September 30th 2023

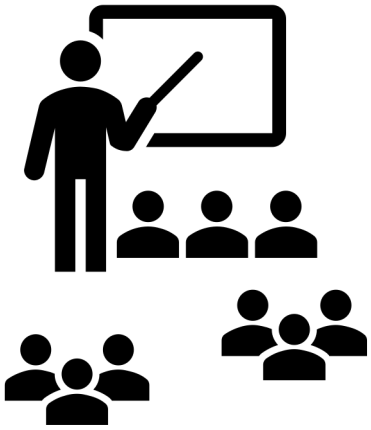
- 8:30 – 9:00 Introduction to the training
- 9:00 – 10:30 Introduction to Sanitation Safety Planning (SSP)
- 10:30 – 11:10 Tea break
- 11:00 – 13:00 Supporting operators in the initiation of Sanitation Safety Planning
- 13:00 – 14:00 Lunch break
- 14:00 - 16:00 Supporting operators to conduct health risk assessments

Day 2: Thursday, September 31st 2023

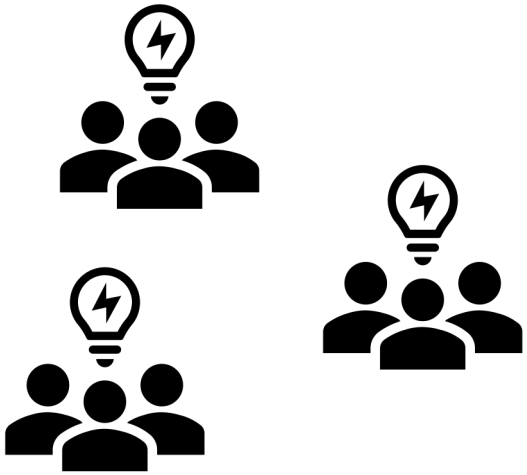
- 8:30 – 10:30 Supporting operator in the development and implementation of an incremental improvement plan
- 10:30 – 11:00 Tea break
- 11:00 – 12:15 Requirements for a successful implementation of SSP
- 12:15 – 13:00 SSP Action plans
- 13:00 – 14:00 Lunch break
- 14:00 – 16:00 Marketplace: Communicating SSP

Methodology of our workshop

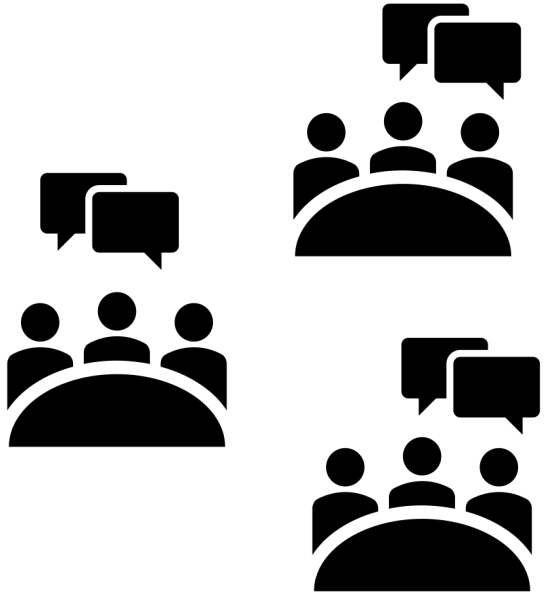
Hands on: to learn it you have to apply it!



Short input



Group Exercises



Plenary discussions

https://ssp-learninghub.creation.camp

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Training videos

PowerPoints, Trainers guide, worksheets

Your training

Supporting documents

SANITATION SAFETY PLANNING

Learning Hub

Welcome to the Sanitation Safety Planning Learning Hub!

Sanitation Safety Planning, or SSP, for short, is a step-by-step risk-based approach for local level risk assessment and management for the sanitation service chain – including toilet, containment/storage and treatment, conveyance, treatment and end use or disposal.

SSP requires capacities from a range of stakeholders to initiate, develop, implement, monitor and sustain the process to safely manage

This training

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ESAWAS REGULATORS ASSOCIATION
Cooperating to promote effective development of water and Sanitation regulation

Training in Formulation and Analysis of KPIs and Sanitation Safety Planning

Maputo, Mozambique. 28th to 31st August 2023

The Eastern and Southern African Water and Sanitation (ESAWAS) Regulators Association, in collaboration with the International Benchmarking Network (IBNET) and the World Health Organization-International Network of Drinking-water and Sanitation Regulators (WHO-RegNet), is organizing this two-day trainings on KPIs and SSPs to be held in Maputo, Mozambique, on Wednesday 30 and Thursday 31 September 2023.

Download and save your worksheets!

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Sanitation Safety Planning

Training for regulators

Step-by-step risk management for safely managed sanitation systems

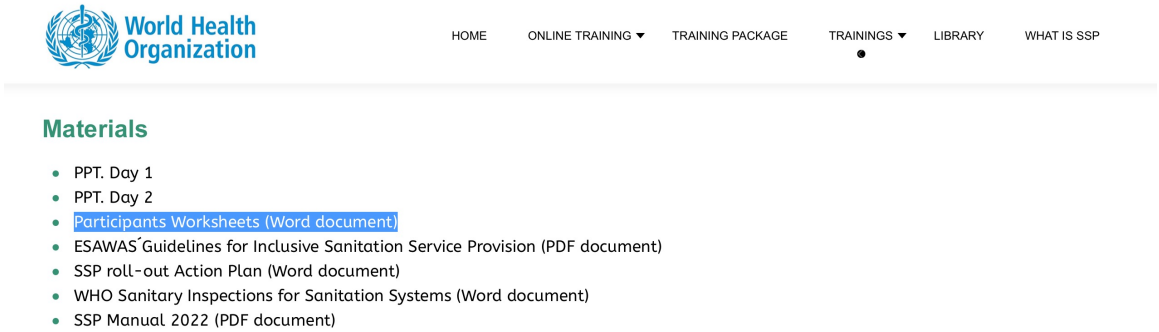
Participants Worksheets

Name of participant:

Organization:

Date:

Place:



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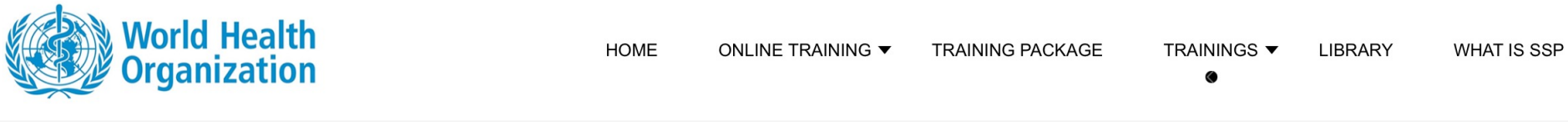
Materials

- PPT. Day 1
- PPT. Day 2
- Participants Worksheets (Word document)
- ESAWAS´Guidelines for Inclusive Sanitation Service Provision (PDF document)
- SSP roll-out Action Plan (Word document)
- WHO Sanitary Inspections for Sanitation Systems (Word document)
- SSP Manual 2022 (PDF document)

8 Group Exercises

Download and save your SSP manual!



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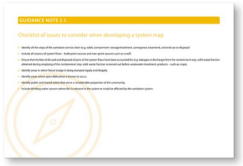
Sanitation Safety Planning Manual

Guidance notes and examples

Get further information on key concepts and their application in examples and real-world cases for each module

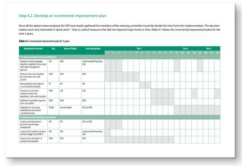


Tools

Get a quick start for a first SSP by using the templates provided, adapting them to your local context.

Worked example

Follow a full worked example from the start to finish of the SSP process using tools and with decision points along the way explained.



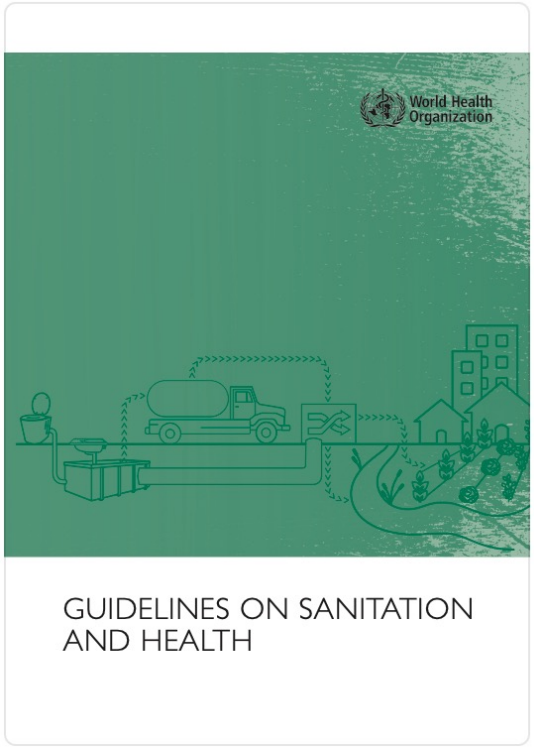
Introduction to Sanitation Safety Planning (SSP)

1. Why do we need Sanitation Safety Planning?

Sanitation

According to the WHO Guidelines on Sanitation and Health:

Sanitation is defined as **access to** and **use of** facilities and services for the **safe disposal** of human urine and faeces.



Sanitation a human right, a public good and is meant to deliver cost-effective **health benefits**.

Pathway in which sanitation shall provide **health and economic benefits**

IMPLEMENTATION
(policy, regulation, finance, organization)

INTERVENTION
(technologies and behavioural change activities)

Access/uptake/use of sanitation interventions → Reduces faecal load in the environment → Reduces human exposure to faecal pathogens → Improves health outcomes and social well-being

But evidence shows lower health impact than expected

Sanitation systems are not interrupting pathogen transmission


The reality of poor
sanitation

Consequences of poor sanitation in public health

Faecal-oral infections: e.g., diarrhea (2016 killed 800 000 people)

Helminth infections

Vector-borne diseases

Sequelae (conditions caused by preceding infections): e.g., stunting.

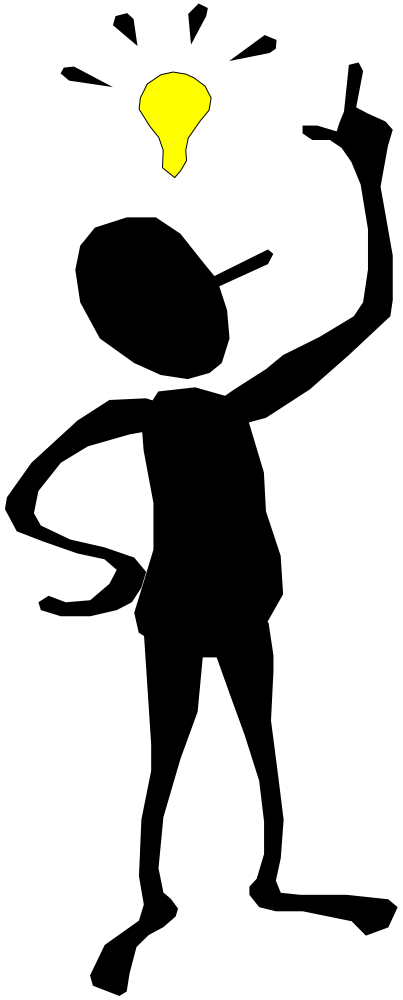
Broader well-being: e.g., anxiety

Source: Uchicago News. Rob Mitchum 2014

What should we do

differently

then?



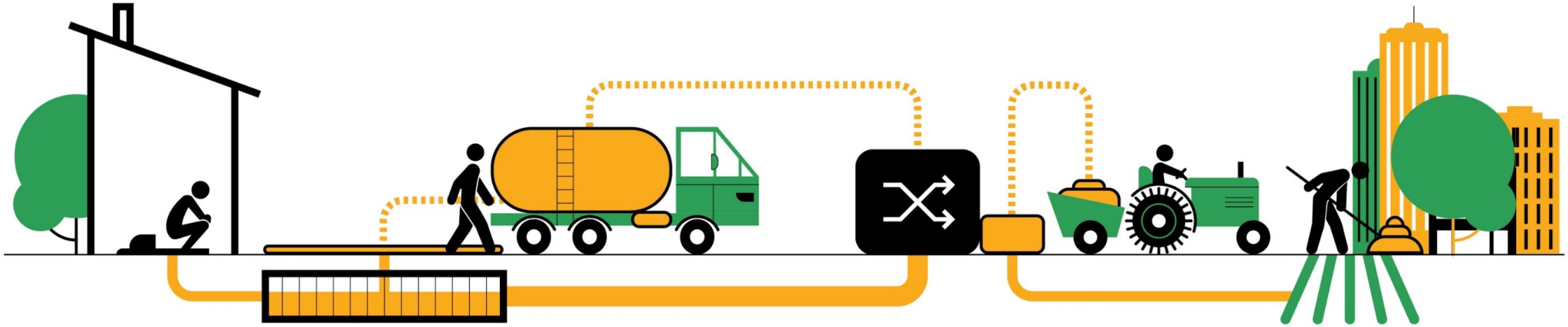
We need to ensure

safety

along the entire sanitation service chain.

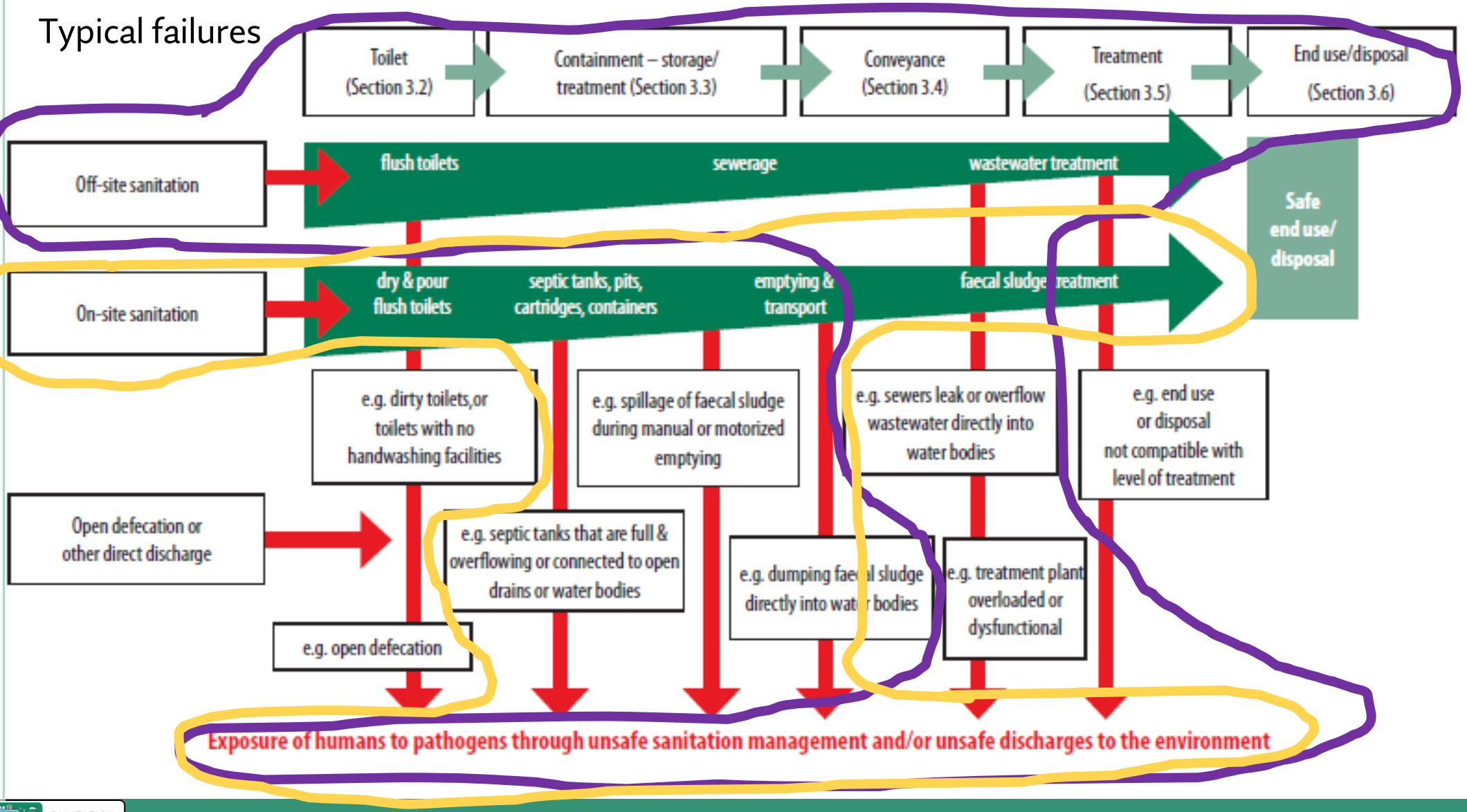
Safe sanitation systems

Arrangement of technologies and practices designed to separate human excreta from human contact at all steps of the **sanitation service chain**.



Failures at any step of the sanitation chain result in negative health outcomes

Typical failures



Risks should be managed along the entire sanitation service chain

Source: Dreamstime

2. What is Sanitation Safety Planning?

WHO recommended approach for local risk **assessment and management** for sanitation systems

- Step-by-step risk-based approach
- Assists in the implementation of local level risk assessment and management
- For the entire sanitation service chain - from toilet, containment/storage and treatment, conveyance, treatment and end use or disposal

SSP ensures that the system is managed to meet the health objectives

WHO 2006 Guidelines for the safe use of wastewater, excreta and greywater

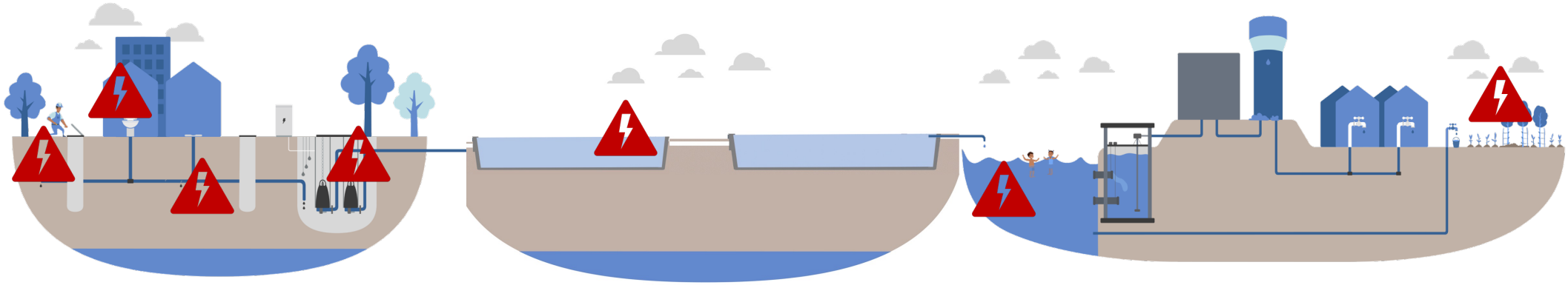
SSP was first published to make the 2006 WHO Guidelines on reuse more widely adopted.

Today, SSP is used for the entire sanitation system.

How does Sanitation Safety Planning work?

Risk assessment and management tool:

- analyse the **sanitation system**;
- Identify the affected people or **exposure groups** (users, workers, communities, famers, consumers);
- understand **transmission pathways** of excreta-related infections;
- identify what could go wrong (**hazardous events**), evaluate the risk;
- prioritize **highest health risk**;
- Implement and monitor **control measures** to avoid exposure.



SSP Modules


Where to do SSP; who to involve?
Prepare for SSP
01
Describe the sanitation system
02
What is the system; who is at risk?
Identify hazardous events, assess existing control measures and expose risks
03
How significant are the risks?
Develop and implement an incremental improvement plan
04
What needs to be improved?
Monitor control measures and verify performance
05
Is the system operating as planned?
Develop supporting programmes and review plans
06
How can we adapt to changes?
SANITATION SAFETY PLANNING

Any question up to this point?

Does this methodology sound familiar?

3. What are the similarities and differences with WSP?

Water Safety Plans

Sanitation Safety Plans

Both are based on the Stockholm Framework for preventive risk assessment and management, and both use the methods and procedures of hazard analysis and critical control point (HACCP).

Systematic Approach to assess, manage and monitor risks

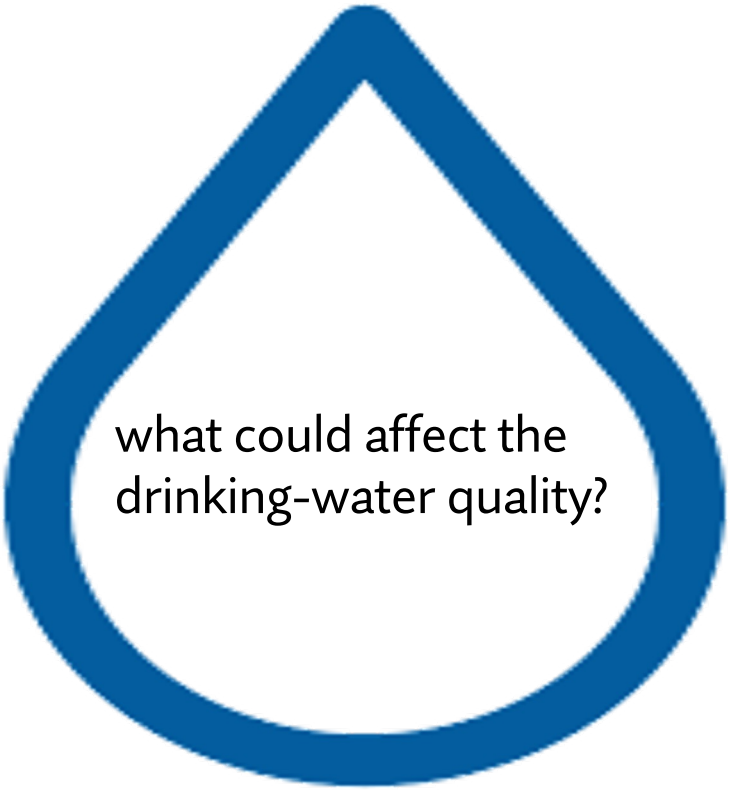
Catchment → Drinking-water consumers

Waste generation (toilet) → (Reuse) Farm - Table

Waste generation (toilet) → (Disposal) Environment

Comparison: the questions we ask....

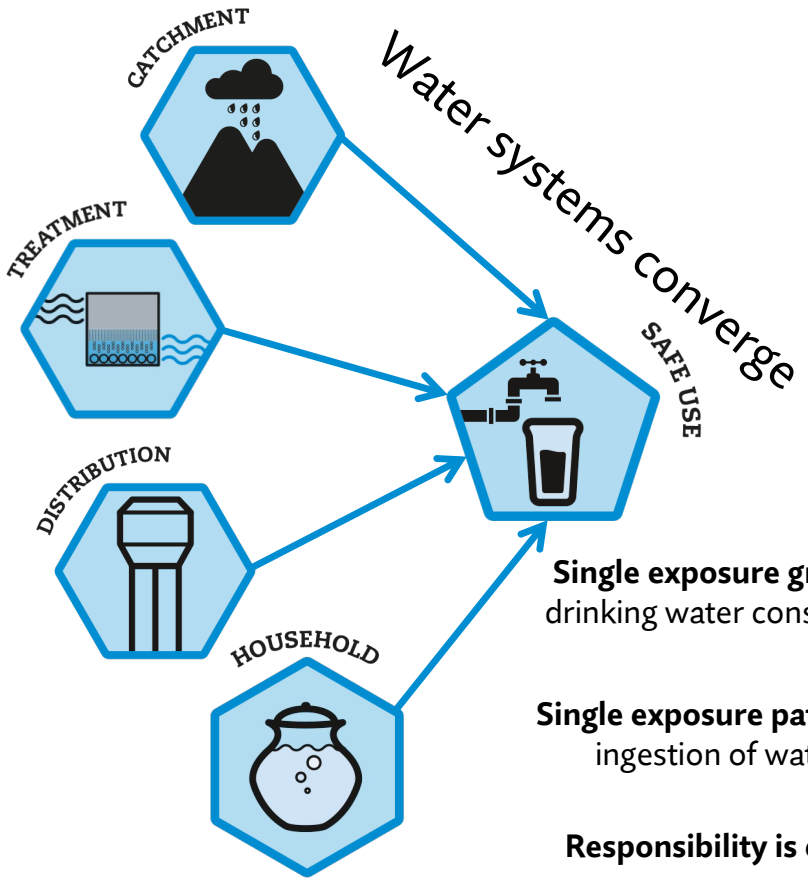
Water Safety Plans



Sanitation Safety Plans

Comparison: the system we look at...

Water Safety Plans

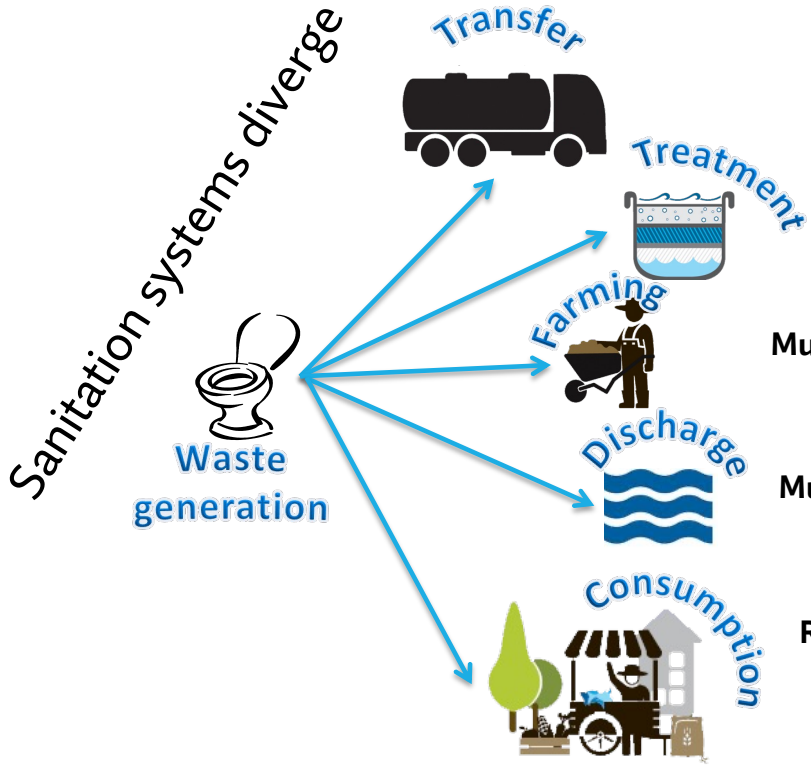


Single exposure group:
drinking water consumer

Single exposure pathway:
ingestion of water

Responsibility is clear

Sanitation Safety Plans



Multiple exposure groups

Multiple exposure pathways

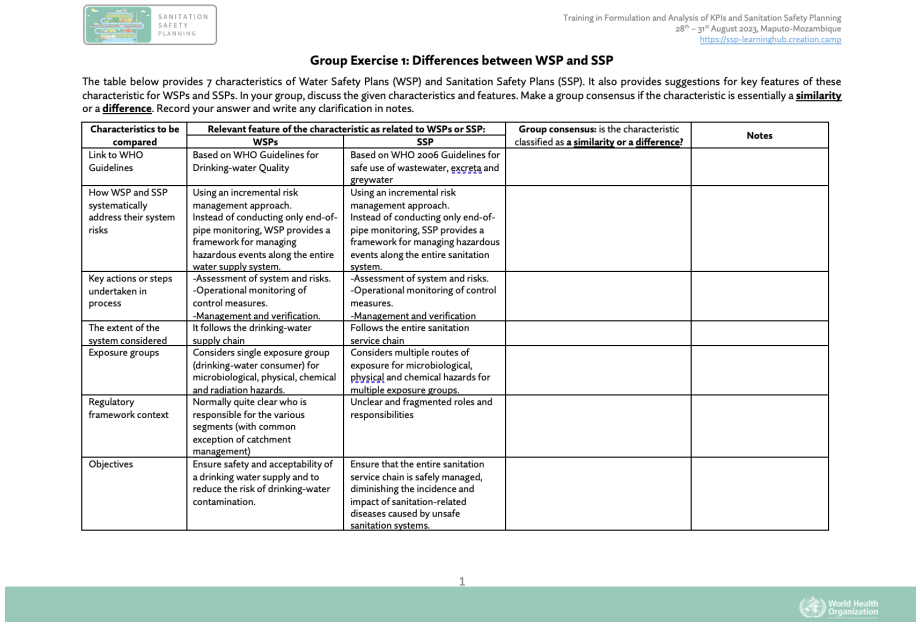
Responsibility is unclear and fragmented

Group Exercise

Group Exercise 1: Differences between WSP and SSP

Work with the colleague sitting besides you:

- Go to page 1 of your worksheets – Group Exercise 1.
- You will see a table that presents 7 characteristics of WSP and SSP and provides suggestions for key features of each characteristics for WSPs and SSPs.
- In groups, you need to decide if each characteristic is a **similarity** or a **difference** between WSP and SSP.



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Group Exercise 1: Differences between WSP and SSP

The table below provides 7 characteristics of Water Safety Plans (WSP) and Sanitation Safety Plans (SSP). It also provides suggestions for key features of these characteristic for WSPs and SSPs. In your group, discuss the given characteristics and features. Make a group consensus if the characteristic is essentially a **similarity** or a **difference**. Record your answer and write any clarification in notes.

Characteristics to be compared	**Relevant feature of the characteristic as related to WSPs or SSP:**		**Group consensus:** is the characteristic classified as a **similarity** or a **difference?**	**Notes**
	WSPs	**SSP**		
Link to WHO Guidelines	Based on WHO Guidelines for Drinking-water Quality	Based on WHO 2006 Guidelines for safe use of wastewater, excreta and greywater		
How WSP and SSP systematically address their system risks	Using an incremental risk management approach. Instead of conducting only end-of-pipe monitoring, WSP provides a framework for managing hazardous events along the entire water supply system.	Using an incremental risk management approach. Instead of conducting only end-of-pipe monitoring, SSP provides a framework for managing hazardous events along the entire sanitation system.		
Key actions or steps undertaken in process	-Assessment of system and risks. -Operational monitoring of control measures. -Management and verification.	-Assessment of system and risks. -Operational monitoring of control measures. -Management and verification		
The extent of the system considered	It follows the drinking-water supply chain	Follows the entire sanitation service chain		
Exposure groups	Considers single exposure group (drinking-water consumer) for microbiological, physical, chemical and radiation hazards.	Considers multiple routes of exposure for microbiological, physical and chemical hazards for multiple exposure groups.		
Regulatory framework context	Normally quite clear who is responsible for the various segments (with common exception of catchment management)	Unclear and fragmented roles and responsibilities		
Objectives	Ensure safety and acceptability of a drinking water supply and to reduce the risk of drinking-water contamination.	Ensure that the entire sanitation service chain is safely managed, diminishing the incidence and impact of sanitation-related diseases caused by unsafe sanitation systems.		

1

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Group Exercise

Back to plenary

Let's discuss

- What would you say is the biggest difference between WSP and SSP?
- Do W&S Utilities in your country implement Water Safety Plans? How has been the experience?
- Do you think the experience with WSP could help to promote SSP? How?

Group Work 2: Understand the value of SSP

Group Exercise

ROLE PLAY:

Let's work in groups of 3

You are part of the Management Board of the Water and Sanitation Utility of Newtown, Sanitola

Welcome to Newtown, Sanitola

Group Exercise

Municipality of 100,000 pp in the outskirts of a metropolitan city

SSP in Newtown

Group Exercise

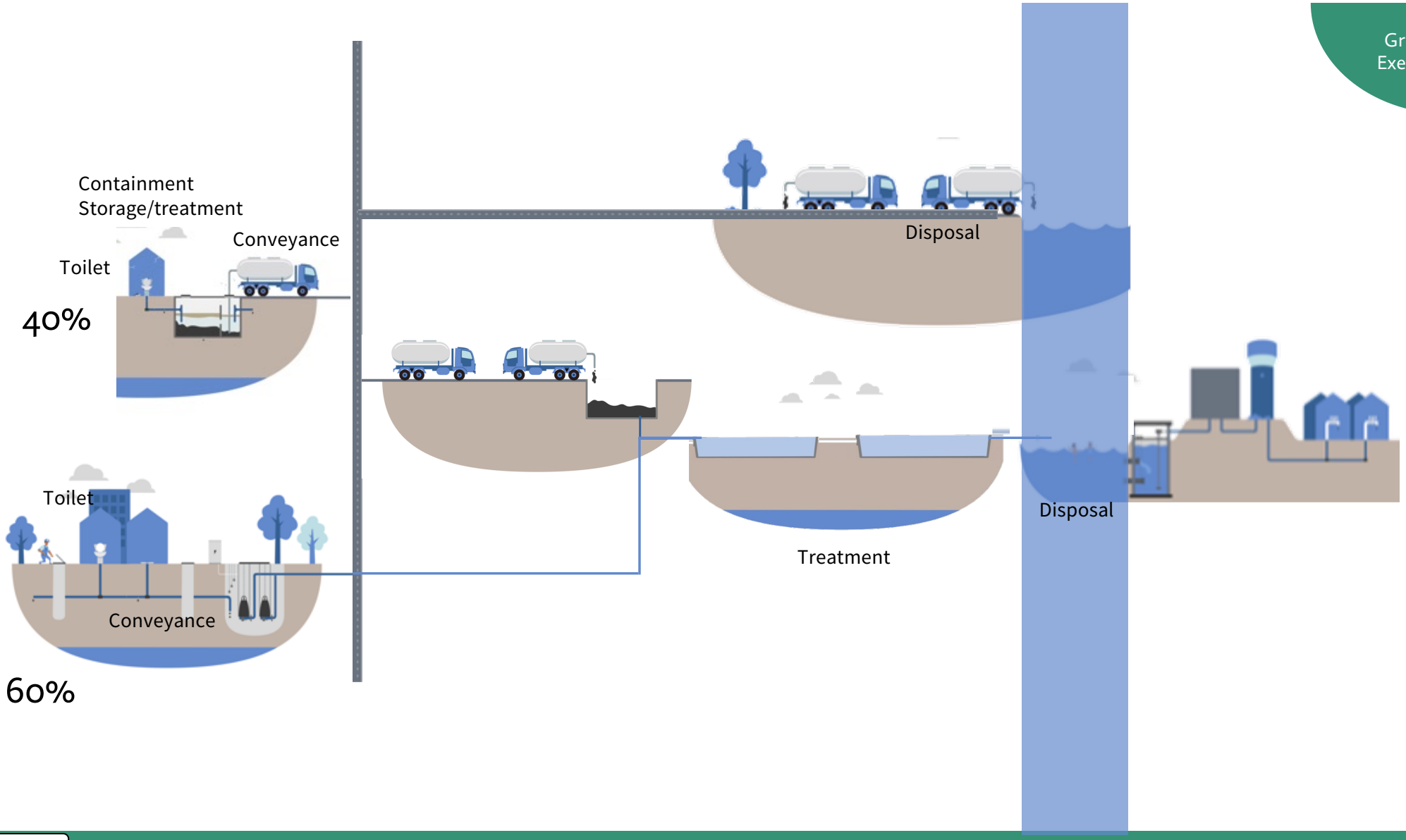
Evidences

- 40% of Newtown's inhabitants are affected by gastro-intestinal disorders.
- Young children report skin diseases.
- According to climate change projections, the area will have more heavy rainfalls and floods.

Kick-off of SSP

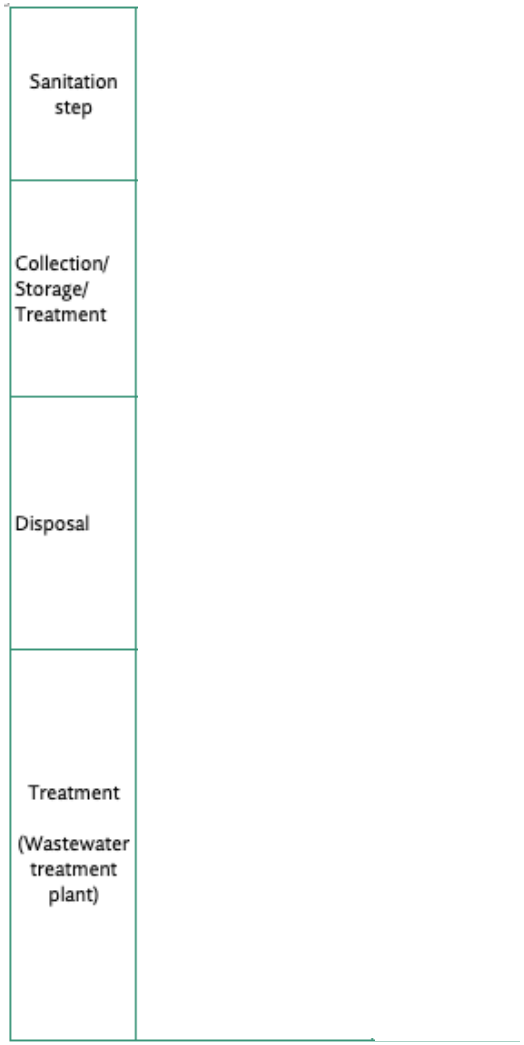
- SSP team, lead by Newtown Water and Sanitation Utility, has been working on it for the past months.
- SSP aims to ensure that the entire sanitation service chain is safely managed, diminishing the incidence and impact of sanitation-related diseases of Newtown's dwellers.

Group Exercise



SSP in Newtown

Group Work



SSP in Newtown

Group Work

Semi-quantitative Risk Assessment Method

TOOL 3.5. Suggested risk definitions for semi-quantitative risk assessment

	DESCRIPTOR	DESCRIPTION
Likelihood (L)		
1	Very unlikely	Has not happened in the past and it is **highly improbable** it will happen in the next 12 months (or another reasonable period).
2	Unlikely	Has not happened in the past but **may occur in exceptional circumstances** in the next 12 months (or another reasonable period).
3	Possible	May have happened in the past and/or **may occur under regular circumstances** in the next 12 months (or another reasonable period).
4	Likely	Has been observed in the past and/or is **likely** to occur in the next 12 months (or another reasonable period).
5	Almost certain	Has often been observed in the past and/or **will almost certainly occur** in most circumstances in the next 12 months (or another reasonable period).
Severity (S)		
1	Insignificant	Hazard or hazardous event resulting in **no or negligible health effects** compared with background levels.
2	Minor	Hazard or hazardous event potentially resulting in **minor health effects** (e.g. temporary symptoms of irritation, nausea, headache).
4	Moderate	Hazard or hazardous event potentially resulting in **self-limiting health effects or minor illness** (e.g. acute diarrhoea, vomiting, upper respiratory tract infection, minor trauma).
8	Major	Hazard or hazardous event potentially resulting in **illness or injury** (e.g. malaria, schistosomiasis, food-borne trematodiases, chronic diarrhoea, chronic respiratory problems, neurological disorders, bone fracture), and/or may lead to **legal complaints** and concern, and/or major **regulatory noncompliance**.
16	Catastrophic	Hazard or hazardous event potentially resulting in **serious illness or injury, or even loss of life** (e.g. severe poisoning, loss of extremities, severe burns, drowning), and/or will lead to **major investigation by regulator**, with prosecution likely.

TOOL 3.6. Semi-quantitative risk assessment matrix

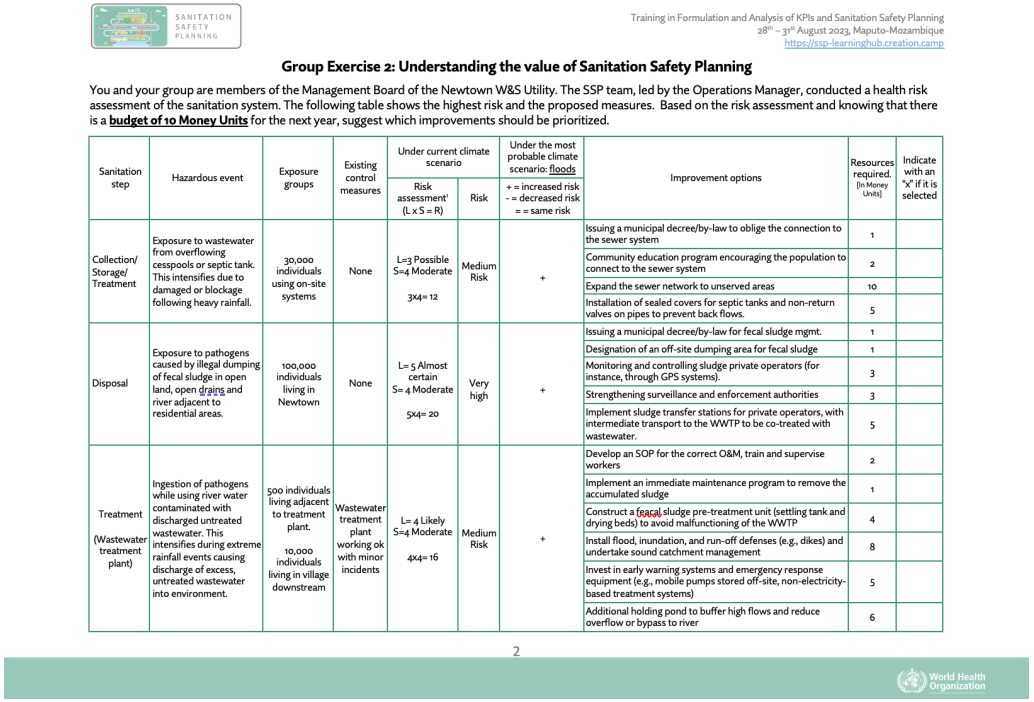
			SEVERITY (S)				
			Insignificant	Minor	Moderate	Major	Catastrophic
			1	2	4	8	16
LIKELIHOOD (L)	Very unlikely	1	1	2	4	8	16
	Unlikely	2	2	4	8	16	32
	Possible	3	3	6	12	24	48
	Likely	4	4	8	16	32	64
	Almost certain	5	5	10	20	40	80
Risk score R = L × S			<6	6–12	13–32	>32	
Risk level			Low risk	Medium risk	High risk	Very high risk	

Group Exercise

Group Exercise 2:

Work with the colleagues sitting besides you, in groups of 3:

- You and your group are part of the Management Board of the W&S utility.
- You find the health risk assessment of the sanitation system in page 2 of your worksheets.
- Based on the health risk assessment, and knowing that there is a budget of **10 Money Units for next year**, decide what should be the priorities, and recommend improvement measures.



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Group Exercise 2: Understanding the value of Sanitation Safety Planning

You and your group are members of the Management Board of the Newtown W&S Utility. The SSP team, led by the Operations Manager, conducted a health risk assessment of the sanitation system. The following table shows the highest risk and the proposed measures. Based on the risk assessment and knowing that there is a **budget of 10 Money Units** for the next year, suggest which improvements should be prioritized.

Sanitation step	Hazardous event	Exposure groups	Existing control measures	Under current climate scenario		Under the most probable climate scenario: floods	Improvement options	Resources required. [In Money Units]	Indicate with an "x" if it is selected
				Risk assessment[1] (L x S = R)	Risk	+ = increased risk - = decreased risk = = same risk			
Collection/ Storage/ Treatment	Exposure to wastewater from overflowing cesspools or septic tank. This intensifies due to damaged or blockage following heavy rainfall.	30,000 individuals using on-site systems	None	L=3 Possible S=4 Moderate 3x4= 12	Medium Risk	+	Issuing a municipal decree/by-law to oblige the connection to the sewer system	1	
							Community education program encouraging the population to connect to the sewer system	2	
							Expand the sewer network to unserved areas	10	
							Installation of sealed covers for septic tanks and non-return valves on pipes to prevent back flows.	5	
Disposal	Exposure to pathogens caused by illegal dumping of fecal sludge in open land, open drains and river adjacent to residential areas.	100,000 individuals living in Newtown	None	L= 5 Almost certain S= 4 Moderate 5x4= 20	Very high	+	Issuing a municipal decree/by-law for fecal sludge mgmt.	1	
							Designation of an off-site dumping area for fecal sludge	1	
							Monitoring and controlling sludge private operators (for instance, through GPS systems).	3	
							Strengthening surveillance and enforcement authorities	3	
							Implement sludge transfer stations for private operators, with intermediate transport to the WWTP to be co-treated with wastewater.	5	
Treatment (Wastewater treatment plant)	Ingestion of pathogens while using river water contaminated with discharged untreated wastewater. This intensifies during extreme rainfall events causing discharge of excess, untreated wastewater into environment.	500 individuals living adjacent to treatment plant. 10,000 individuals living in village downstream	Wastewater treatment plant working ok with minor incidents	L= 4 Likely S=4 Moderate 4x4= 16	Medium Risk	+	Develop an SOP for the correct O&M, train and supervise workers	2	
							Implement an immediate maintenance program to remove the accumulated sludge	1	
							Construct a fecal sludge pre-treatment unit (settling tank and drying beds) to avoid malfunctioning of the WWTP	4	
							Install flood, inundation, and run-off defenses (e.g., dikes) and undertake sound catchment management	8	
							Invest in early warning systems and emergency response equipment (e.g., mobile pumps stored off-site, non-electricity-based treatment systems)	5	
							Additional holding pond to buffer high flows and reduce overflow or bypass to river	6	

2

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Tea Break

Back to plenary

Let's discuss

- What needs/problems can SSP help utilities to solve?
- How is SSP a solution?
- What are the benefits of Sanitation Safety Planning?

Sanitation Safety Planning Benefits

- Maximizes health benefits of sanitation interventions
- Prioritizes efforts
- Sets a plan for incremental improvements
- Targets investments to the highest health risks
- Coordinates efforts

SSP in a nutshell

- is the WHO recommended approach for local risk assessment and management for sanitation systems;
- helps to maximize health benefits and minimize health risks;
- guides efforts to where it will have the most impact;
- helps to coordinate efforts of the many stakeholders along the sanitation chain, and stimulates policy dialogue.

Supporting operators in the initiation of Sanitation Safety Planning

SSP Modules

Where to do SSP; who to involve?

Page 7 of your SSP manual

What is the system; who is at risk?

How significant are the risks?

What needs to be improved?

Is the system operating as planned?

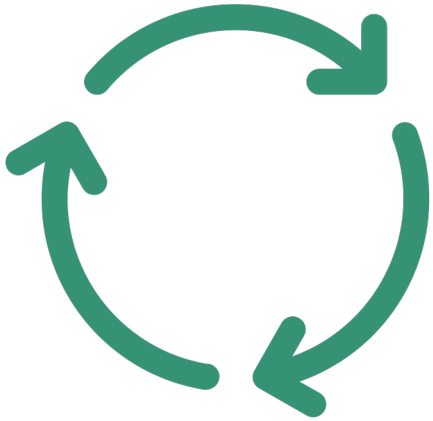
How can we adapt to changes?

Module 1: Prepare for SSP

SSP requires clarity on the area where SSP will be applied and the organization/department/person that will lead the SSP process.

Steps

- Define the SSP area and lead organization
- Assemble the SSP team
- Establish SSP priorities

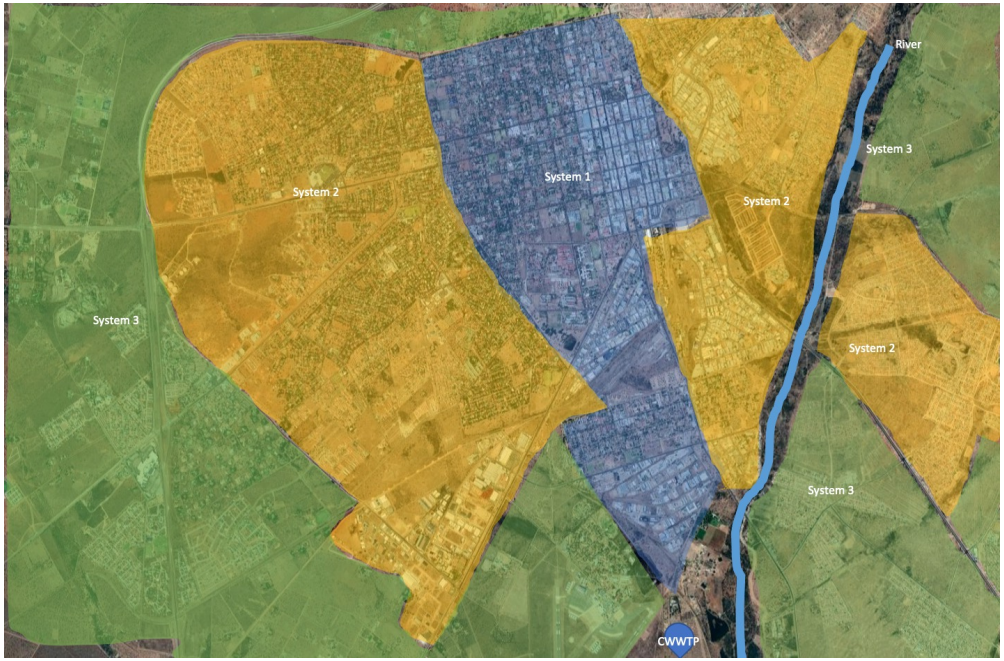


Outputs

- Agreed SSP area and leadership.
- A multidisciplinary team representing the sanitation chain for development and implementation of SSP

Define the SSP area and lead organization

Option 1: When SSP is initiated in a municipality, district, or other administrative unit



SSP Leader: officer of a local authority with the mandate for oversight of sanitation service provision

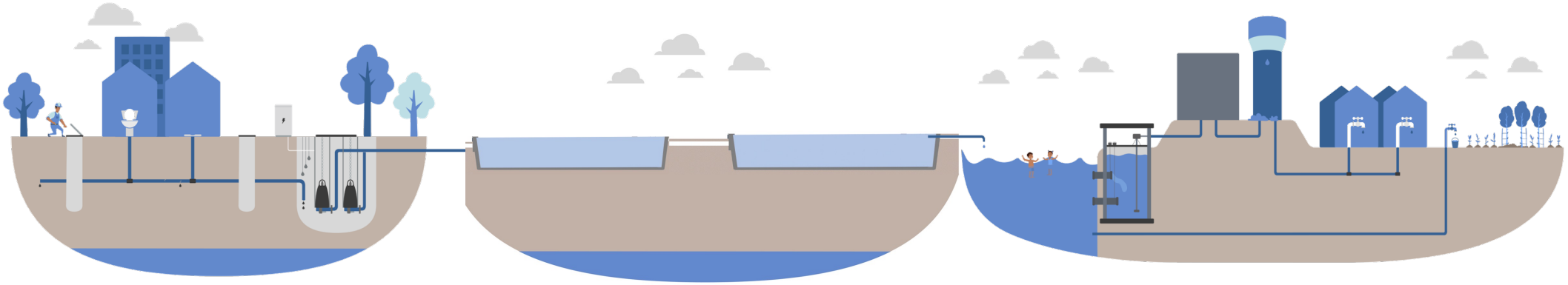
Option 2: When SSP is implemented by the sanitation service provider

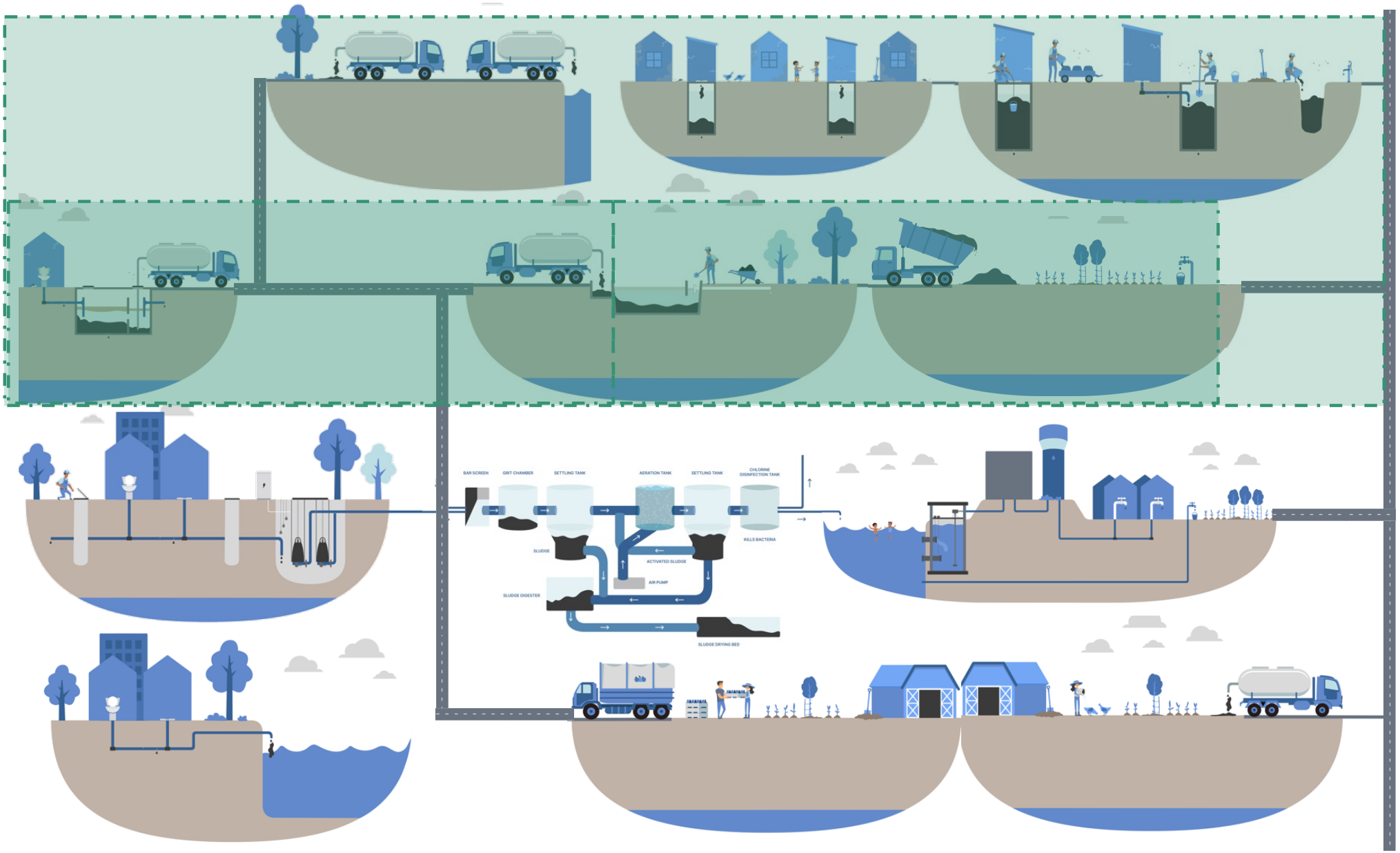
SSP Leader: Person identified within the utility's organization

Aim

To ensure that the sanitation systems **under their responsibility** are safely operated and their products (e.g., treated wastewater or dried sludge) do **not pose health risks** during disposal or use.

… under their responsibility




BAR SCREEN
GRIT CHAMBER
SETTLING TANK
AERATION TANK
SETTLING TANK
CHLORINE DISINFECTION TANK
KILLS BACTERIA
SLUDGE
ACTIVATED SLUDGE
AIR PUMP
SLUDGE DIGESTER
SLUDGE DRYING BED

How is this in your country?

What is the intervention area of the utilities/operators you regulate?

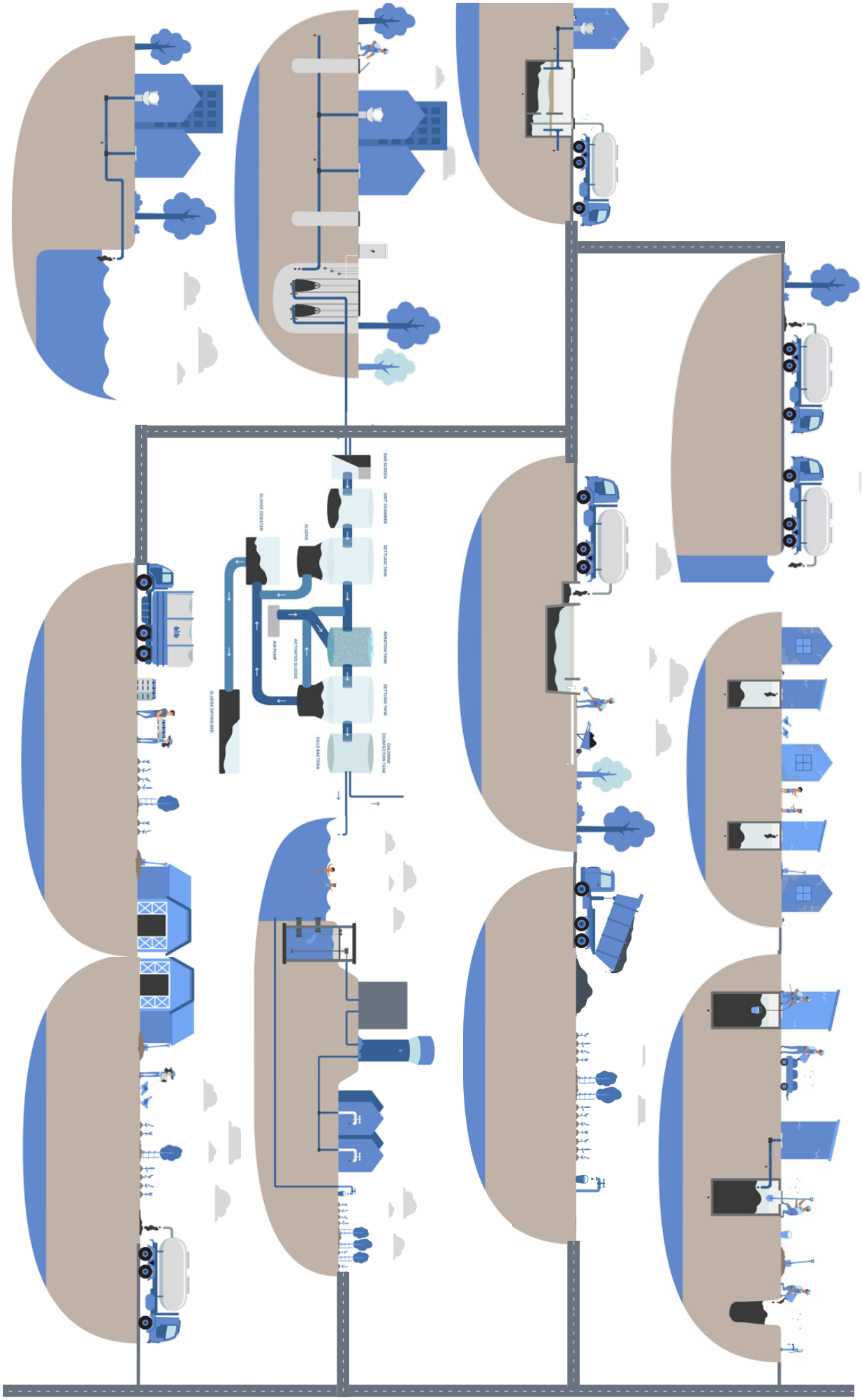
Aim

To ensure that the sanitation systems **under their responsibility** are safely operated and their products (e.g., treated wastewater or dried sludge) **do not pose health risks** during disposal or use.

... do not pose health risks

Now think about:

Who can judge if a system is safely operated and if the products pose health risk ?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SLUDGE
SLUDGE DIGESTER
SLUDGE DRYING BED

Assemble the SSP team

The SSP team should:

- Have the skills, knowledge, information and resources to identify all the problems.
- Represent the whole sanitation service system and services.
- Be able to drive improvements in all areas of sanitation.
- Have members with public health expertise and climate change.

Photo: 20 minutos

Photo: L. Barreto

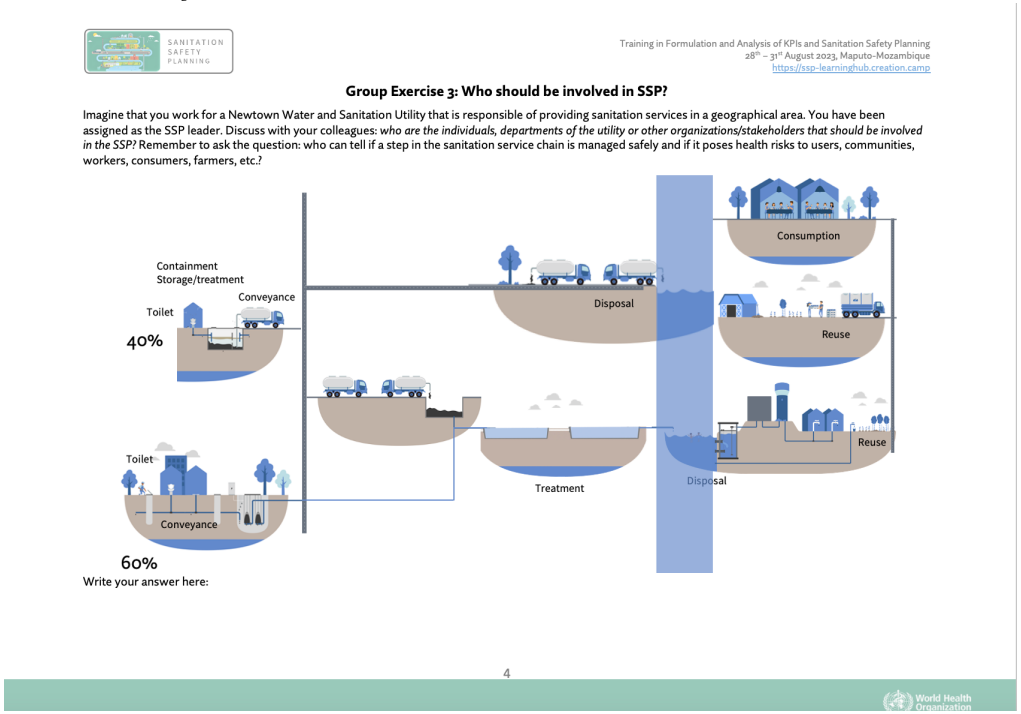
Any question up to this point?

Group Exercise 3

Work with your colleagues sitting besides you.

- Go to page 4 of your worksheets – Group Exercise 3.

- You have been assigned as the SSP leader of the Newtown Utility. Decide who should be engaged in the SSP? And why?



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Group Exercise 3: Who should be involved in SSP?

Imagine that you work for a Newtown Water and Sanitation Utility that is responsible of providing sanitation services in a geographical area. You have been assigned as the SSP leader. Discuss with your colleagues: *who are the individuals, departments of the utility or other organizations/stakeholders that should be involved in the SSP?* Remember to ask the question: who can tell if a step in the sanitation service chain is managed safely and if it poses health risks to users, communities, workers, consumers, farmers, etc.?

Write your answer here:

4

World Health Organization

Back to plenary

Let's discuss

- Which are the utility's departments that should be involved in SSP?
- Which are the "external organizations" that should be involved in SSP?
- Why is it important to involve the correct stakeholders?

SSP Modules

Where to do SSP; who to involve?

What is the system; who is at risk?

Page 19 of your SSP manual

How significant are the risks?

What needs to be improved?

Is the system operating as planned?

How can we adapt to changes?

Module 2: Describe the sanitation system

Module 2 generates a **complete description of the sanitation system**. This supports the subsequent risk assessment process.

Steps

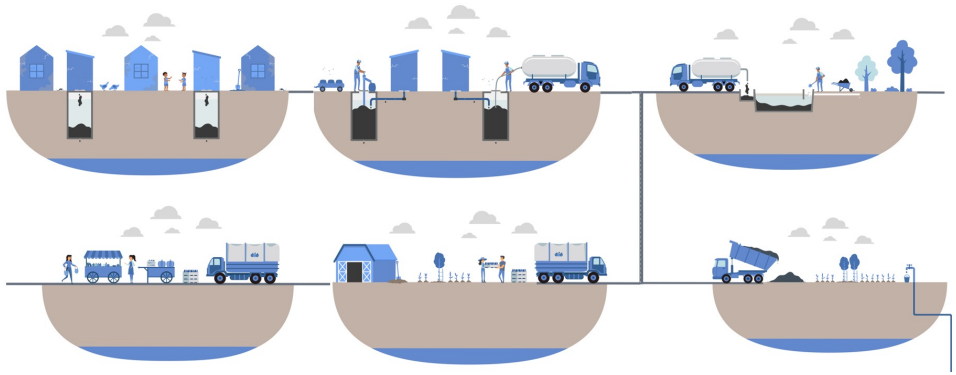
- Map the system
- Characterize system flows
- Identify exposure groups
- Gather supporting information
- Confirm the system description

Outputs

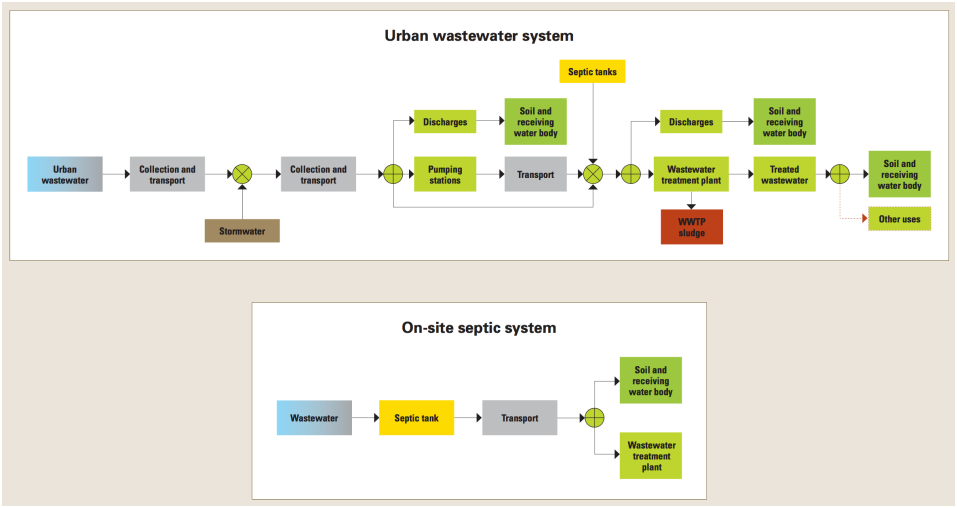
- A map and description of the sanitation system.
- An understanding of the constituents (excreta and mixed waste) in flows at all steps of the system.
- An identification and characterization of exposure groups.
- An understanding of the factors affecting the performance and vulnerability of the system.
- A compilation of relevant technical, legal and regulatory information.

Map the system

Simplified drawings



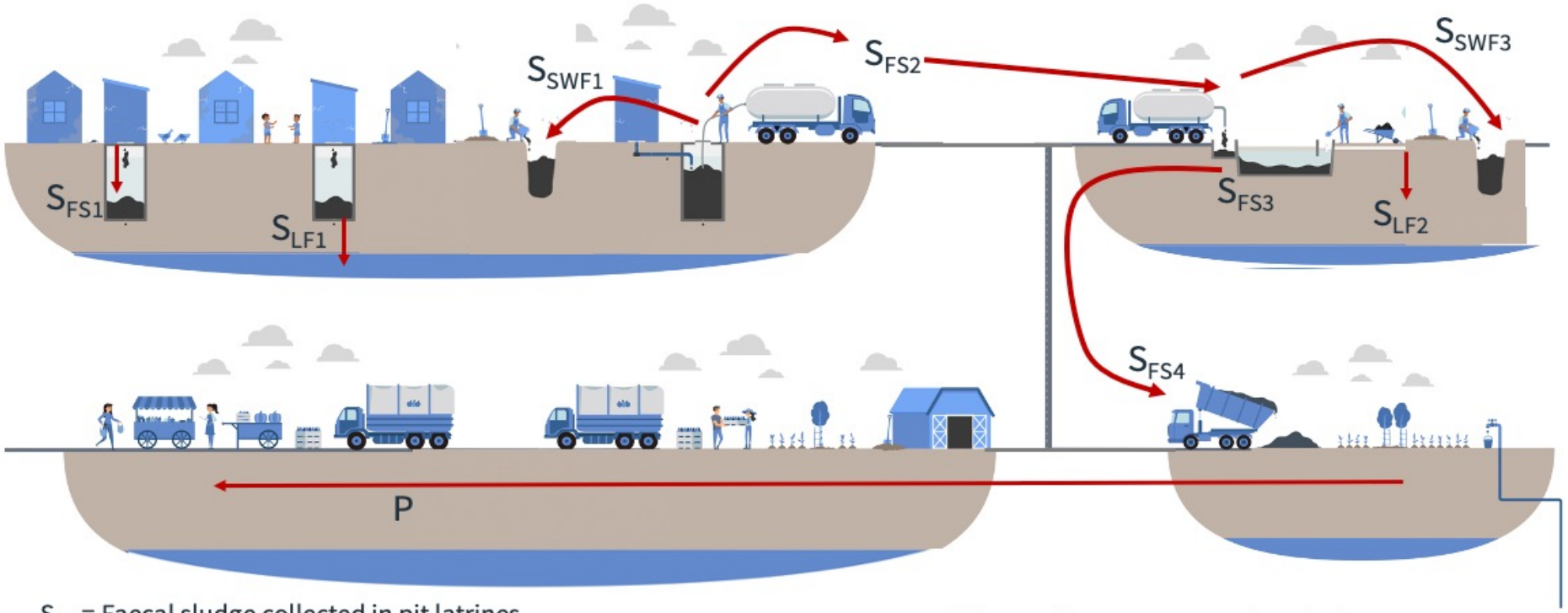
System process diagram



- Two methods can be combined.
- A geographic map could also be used.
- The path of all fractions of the waste (solid and liquid) along all sanitation steps should be followed.
- Mapping is not simply a desk-based exercise.
- Site visits should be conducted.

Map the system

Indicate the path of different flows through the sanitation system



S_{FS1}= Faecal sludge collected in pit latrines

S_{LF1}= Liquid fraction that percolates from the pits

S_{SWF1}= Solid waste fraction obtained during emptying of pits

S_{FS2}= Faecal sludge emptied in vacuum trucks and transported to the treatment plant

S_{SWF3}= Solid waste fraction screened out before treatment

S_{FS3}= Faecal sludge treated

S_{LF2}= Liquid fraction infiltrated from the treatment plant

S_{FS4}= Dried faecal sludge transported to agricultural land

P= Produce reaching the market

Characterize system flows

Sanitation step	Description of the system flow	Key information	Expected variations	Type of potential hazard
P1: Toilet and containment-storage/treatment in pit latrines	S_{FS1}= Faecal sludge collected in pit latrines Fecal sludge – solids and water which is collected in underground tanks.	About 7000 m^3 collected. BOD could reach 600 mg/l	This has the potential to contain some anal cleansing material, and feminine hygiene products, sharp objects, and other foreign material. Also, because of greywater, it will contain chemicals.	Biological Physical Chemical
P3: Transfer of the faecal sludge in the WWTP	S_{F2}= Faecal sludge emptied in vacuum trucks and transported to the WWTP	About 20 m^3 of faecal sludge are emptied every day.	No expected variations	Biological

What is a hazard?

A biological, chemical or physical constituent that can cause harm to human health.

Biological

Microbiological pathogens:

- Bacteria
- Viruses
- Protozoa
- Helminths
- Vector-borne

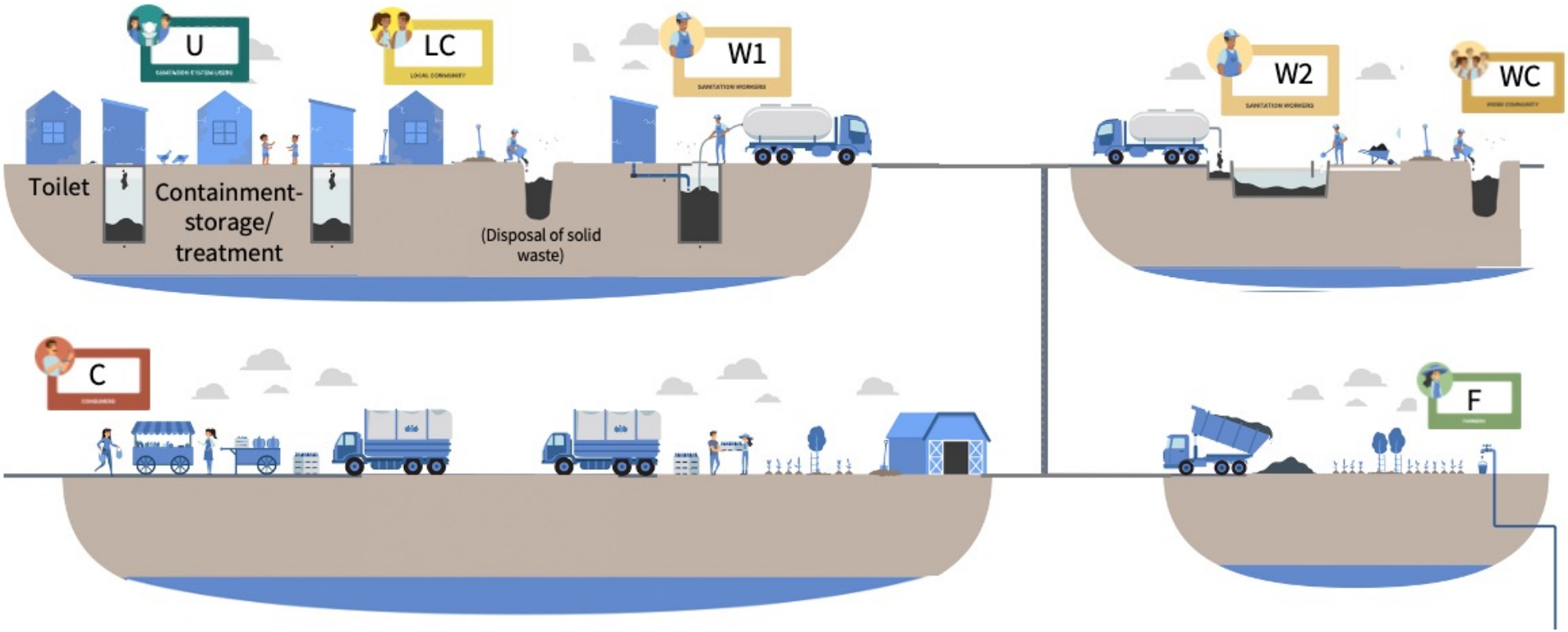
Chemical

- Heavy metals in sludge or biosolids
- Herbicides and pesticides

Physical

- Sharps (e.g. needles)
- Odours
- Physical injury from equipment

Identify exposure groups



- U= Sanitation systems users
- W= Workers
- L= Local community
- WC= Wider community
- C= Consumers
- F= Farmers

Characterize exposure groups

Sanitation step	Exposure Group ID	Who are the exposure groups?	How many are there?	What are they doing there?	What are they exposed to?	How often are they exposed to this?
P1: Toilet and containment-storage/treatment with cesspools and septic tanks	U1	Users of flush toilets connected to septic tanks and cesspools tanks in their properties.	6,000 household (around 30,000 pp). About 40% are children	Septic tanks and cesspools are usually outside the house, in the backyard. Kids play and adults perform different activities in the vicinities of the tank.	They could have contact to wastewater during overflows. They are exposed to microbial microorganisms.	Overflow could happen every three years, however it is more frequent during heavy rainfalls.
T1: Conveyance by vacuum trucks	W1	Private vacuum truck operators	About 60 operators (There are 28 trucks. They work in groups of 2)	They are opening the underground tanks, inserting the hose, and emptying the cesspools. They also handle the solid waste extracted.	They are in direct contact with the fecal sludge, full of pathogens and nematodes.	Everyday

Gather compliance and contextual information

To identify the relevant health hazards to which our exposure groups are exposed.

For that, we collect and document information about the context (the reality) in which the sanitation system exists.

Characterize waste fractions from → Potential health hazards → Contextual and health data → Identify relevant health hazards

Use epidemiological and environmental data where available.

Gather compliance and contextual information

Regulatory requirements

- Relevant laws and by-laws
- Effluent discharge quality standards
- Guidelines for climate change preparedness or disaster planning

Demographics and land use patterns

- Demographics, land use
- Formal and informal settlements
- Areas predicted for high population growth

System management and performance

- Monitoring and surveillance records
- Epidemiological data
- Types and amount of products produced

Changes related to climate and weather

- Seasonal changes and impacts on loadings
- Seasonal crop and harvest data
- Additional inflows during heavy rains
- Changes in water usage due to scarcity

Confirm the system description

- Previous steps probably largely a desk exercise.
- **There is a need to check** through **field investigations** to ensure that the information is complete and accurate.
- Tools: sanitary surveillance, transect walks, focus group tools etc.
- Validate claimed treatment efficiency by references, testing programmers etc.

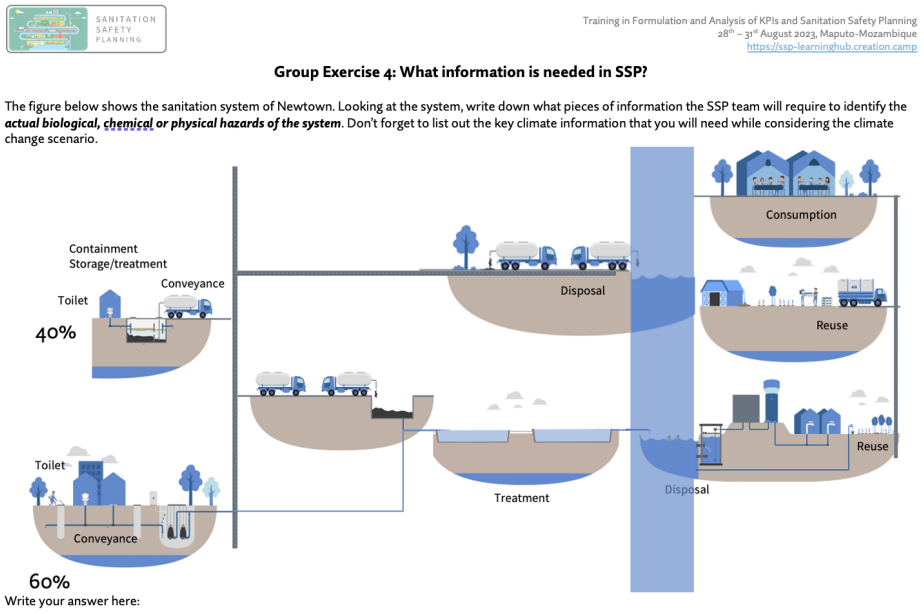
Any question up to this point?

Group Exercise 4

Work with your colleagues sitting besides you.

- Go to page 5 of your worksheets – Group Exercise 4.

- Write down what pieces of information the SSP team will require **to identify the actual** biological, chemical or physical hazards of the system.



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Group Exercise 4: What information is needed in SSP?

The figure below shows the sanitation system of Newtown. Looking at the system, write down what pieces of information the SSP team will require to identify the ***actual biological, chemical or physical hazards of the system***. Don't forget to list out the key climate information that you will need while considering the climate change scenario.

Write your answer here:

5

World Health Organization

Back to plenary

Let's discuss

- What information is required to describe the sanitation system?
- Is this information available in your country?

Lunch Break

Supporting operators to conduct health risk assessments

SSP Modules

Where to do SSP; who to involve?

What is the system; who is at risk?

How significant are the risks?

What needs to be improved?

Is the system operating as planned?

How can we adapt to changes?

Page 37 of your SSP manual

Module 3: Identify hazards, asses existing controls and assess exposure risk

This help SSP teams to respond to the question:

"How significant are the risks?"

Steps

- Identify hazards and hazardous events.
- Identify and assess existing control measures.
- Assess and prioritize the exposure risk.

Outputs

- A risk assessment table.
- A prioritized list of hazardous events to guide system improvements.

This ensures that subsequent investments in system's monitoring and improvements **first** respond to **highest health risks**.

What is a Risk Assessment Table?

Risk Assessment Table

Component	Hazard Identification				Existing Control(s)		Risk Assessment						Comments
							Under current conditions				Under the most likely climate change scenarios:		
Sanitation step	Hazardous event	Hazard	EG	Number of persons at risk	Description of existing control	Validation	L	S	Score	R	Drought	Floods	
P5 Flush toilets discharging in open drains	Ingestion after contact with excreta in non-functional toilets	All microbial pathogens	U2	5,000 pp	Flush toilets and water supply	Visual survey	4	2	8	M	+	-	Currently, households do not have a continuous water supply. This worsens in dry conditions and there is not enough water to flush toilets.
T1 Conveyance by vacuum trucks	Ingestion after contact with raw sewage during vacuum tanker operation	All microbiol ogical pathogens	W1	60	Nil	n/a	3	4	12	M	=	+	Handwashing and washing of equipment after emptying activities is not widely practiced. In flooding conditions, the likelihood will increase.
P4 Disposal of fecal sludge in open drains	Ingestion after contact with fecal sludge discharged without treatment to open drains	All microbial pathogens	L2	50,000 pp	Nil	n/a	5	8	40	VH	=	+	The risk increases during heavy rains.

Identification of the sanitation chain step (s) one by one:

Component	Hazard Identification				Existing Control(s)		Risk Assessment						Comments
							Under current conditions				Under the most likely climate change scenarios:		
Sanitation step	Hazardous event	Hazard	EG	Number of persons at risk	Description of existing control	Validation	L	S	Score	R	Drought	Floods	
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Hazard

A biological, chemical or physical constituent that can cause harm to human health.

≠

Hazardous event

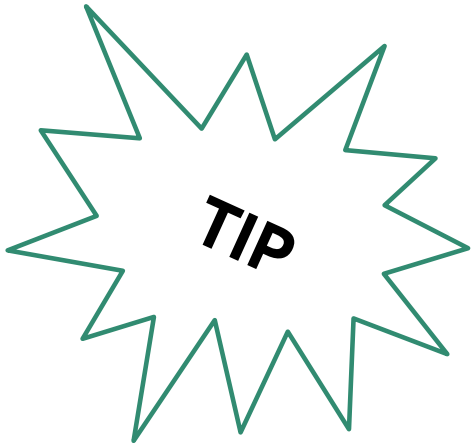
Any incident or situation that:

- **introduces** or releases the hazard,
- **amplifies** the concentration of the hazard in the environment,
- **fails to remove the hazard** from the human environment.

Hazard, hazardous event, effect, risk, ...!?

Hazard(s)		Hazardous event		Health effects
Biological (e.g. bacteria, virus)	+	Ingesting contaminated water after falling into wastewater channel	→	e.g. diarrhoea
Chemical (e.g. toxins)				skin irritation
Physical (e.g. water)				drowning

Hazard ≠ Hazardous event



A good hazardous event tells a short story.

The **villain** is the **hazard** and the hazardous event (the story) says what happens - how the **villain** causes harm.

For example:

*Workers ingest **pathogens** in raw wastewater during maintenance activities in open drains*

Identification of the hazardous event

Component	Hazard Identification				Existing Control(s)		Risk Assessment						Comments
							Under current conditions				Under the most likely climate change scenarios:		
Sanitation step	Hazardous event	Hazard	EG	Number of persons at risk	Description of existing control	Validation	L	S	Score	R	Drought	Floods	
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6 exposure routes

- Ingestion (unintentional) after contact with wastewater/excreta

- Ingestion of contaminated water

- Consumption of contaminated produce

- Dermal (skin) contact with excreta and wastewater

- Vector-borne with flies/mosquitoes/ cockroaches

- Inhalation of aerosols and particles

Identification of the hazard:

Component	Hazard Identification				Existing Control(s)		Risk Assessment						Comments
							Under current conditions				Under the most likely climate change scenarios:		
Sanitation step	Hazardous event	Hazard	EG	Number of persons at risk	Description of existing control	Validation	L	S	Score	R	Drought	Floods	
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Identification of the exposure groups and the number of persons at risk:

Component	Hazard Identification				Existing Control(s)		Risk Assessment						Comments
							Under current conditions				Under the most likely climate change scenarios:		
Sanitation step	Hazardous event	Hazard	EG	Number of persons at risk	Description of existing control	Validation	L	S	Score	R	Drought	Floods	
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What is a control measure?

A control measure is any action or activity (or barrier) that can prevent or eliminate a sanitation-related hazard or reduce it to an acceptable level.

SSP Teams must consider how effective the existing control measure:

1. could be, assuming it was always working well

2. is in practice, considering actual site conditions, enforcement of existing rules and regulations and operating practices.

Identification of the existing control measures:

Component	Hazard Identification				Existing Control(s)		Risk Assessment						Comments
							Under current conditions				Under the most likely climate change scenarios:		
Sanitation step	Hazardous event	Hazard	EG	Number of persons at risk	Description of existing control	Validation	L	S	Score	R	Drought	Floods	
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Semi-quantitative risk assessment method

Likelihood (L) x Severity (S) = Risk

Definitions of Likelihood (L)

TOOL 3.5. Suggested risk definitions for semi-quantitative risk assessment

	DESCRIPTOR	DESCRIPTION
Likelihood (L)		
1	Very unlikely	Has not happened in the past and it is **highly improbable** it will happen in the next 12 months (or another reasonable period).
2	Unlikely	Has not happened in the past but **may occur in exceptional circumstances** in the next 12 months (or another reasonable period).
3	Possible	May have happened in the past and/or **may occur under regular circumstances** in the next 12 months (or another reasonable period).
4	Likely	Has been observed in the past and/or is **likely** to occur in the next 12 months (or another reasonable period).
5	Almost certain	Has often been observed in the past and/or **will almost certainly occur** in most circumstances in the next 12 months (or another reasonable period).

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Semi-quantitative risk assessment method

Likelihood (L) x Severity (S) = Risk

Definitions of Severity (S)

Severity (S)		
1	Insignificant	Hazard or hazardous event resulting in **no or negligible health effects** compared with background levels.
2	Minor	Hazard or hazardous event potentially resulting in **minor health effects** (e.g. temporary symptoms of irritation, nausea, headache).
4	Moderate	Hazard or hazardous event potentially resulting in **self-limiting health effects or minor illness** (e.g. acute diarrhoea, vomiting, upper respiratory tract infection, minor trauma).
8	Major	Hazard or hazardous event potentially resulting in **illness or injury** (e.g. malaria, schistosomiasis, food-borne trematodiases, chronic diarrhoea, chronic respiratory problems, neurological disorders, bone fracture), and/or may lead to **legal complaints** and concern, and/or major **regulatory noncompliance**.
16	Catastrophic	Hazard or hazardous event potentially resulting in **serious illness or injury, or even loss of life** (e.g. severe poisoning, loss of extremities, severe burns, drowning), and/or will lead to **major investigation by regulator**, with prosecution likely.

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Semi-quantitative risk assessment method

Likelihood (L) x Severity (S) = Risk

TOOL 3.6. Semi-quantitative risk assessment matrix

			SEVERITY (S)				
			Insignificant 1	Minor 2	Moderate 4	Major 8	Catastrophic 16
LIKELIHOOD (L)	Very unlikely	1	1	2	4	8	16
	Unlikely	2	2	4	8	16	32
	Possible	3	3	6	12	24	48
	Likely	4	4	8	16	32	64
	Almost certain	5	5	10	20	40	80
Risk score R = L × S			<6	6–12		13–32	>32
Risk level			Low risk	Medium risk		High risk	Very high risk

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Health risk assessment under current conditions:

Component	Hazard Identification				Existing Control(s)		Risk Assessment: Under current conditions				Risk Assessment: Under the most likely climate change scenarios:		Comments
Sanitation step	Hazardous event	Hazard	EG	Number of persons at risk	Description of existing control	Validation	L	S	Score	R	Drought	Floods	
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TOOL 3.6. Semi-quantitative risk assessment matrix

			SEVERITY (S)				
			Insignificant 1	Minor 2	Moderate 4	Major 8	Catastrophic 16
LIKELIHOOD (L)	Very unlikely	1	1	2	4	8	16
	Unlikely	2	2	4	8	16	32
	Possible	3	3	6	12	24	48
	Likely	4	4	8	16	32	64
	Almost certain	5	5	10	20	40	80
Risk score R = L × S			<6	6–12	13–32		>32
Risk level			Low risk	Medium risk	High risk		Very high risk

Climate change considerations when assessing risk

Likelihood of hazardous events may change...

- Under drought, sewer overflow frequency may reduce

Severity of hazardous events may change...

- Discharge of effluent to a river is more significant during drought as the concentration of pollutants would be high

Therefore, we need to:

- Consider climate change projections to estimate risk.
- When not available, consider different climate scenarios.
- Prioritize climate scenarios that results in the largest increase in risk.

Health risk assessment under the most likely climate change scenarios:

SCENARIO 1: Drought

SCENARIO 2: More intense precipitation

Does the risk increase, decrease or remain the same?

Component	Hazard Identification				Existing Control(s)		Risk Assessment						Comments
							Under current conditions				Under the most likely climate change scenarios:		
Sanitation step	Hazardous event	Hazard	EG	Number of persons at risk	Description of existing control	Validation	L	S	Score	R	Drought	Floods	
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\+ - =

Justify in comments

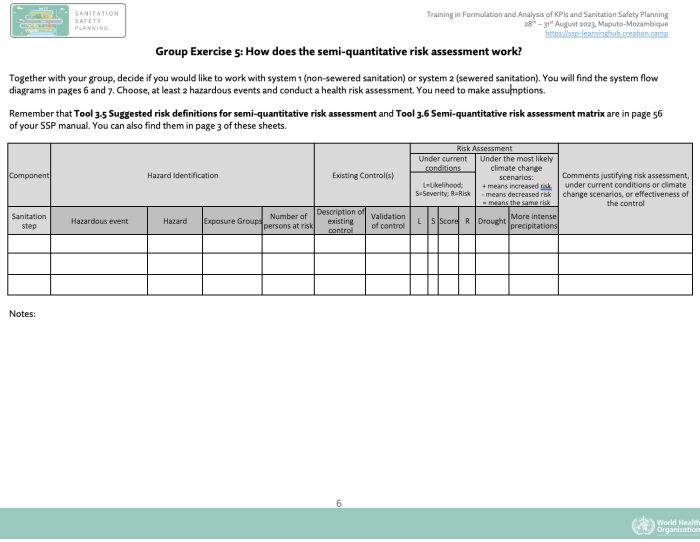
Any question up to this point?

Group Exercise

Group Exercise 5

You will conduct a health risk assessment:

- Go to page 6 of your worksheets – Group Exercise 5.
- In groups, you will decide if you would like to work with a **non-sewered sanitation** system or a **sewered sanitation** system.
- You need to complete the table for at least 2 hazardous events



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Group Exercise 5: How does the semi-quantitative risk assessment work?

Together with your group, decide if you would like to work with system 1 (non-sewered sanitation) or system 2 (sewered sanitation). You will find the system flow diagrams in pages 6 and 7. Choose, at least 2 hazardous events and conduct a health risk assessment. You need to make assumptions.

Remember that **Tool 3.5 Suggested risk definitions for semi-quantitative risk assessment** and **Tool 3.6 Semi-quantitative risk assessment matrix** are in page 56 of your SSP manual. You can also find them in page 3 of these sheets.

Component	Hazard Identification				Existing Control(s)		Risk Assessment						Comments justifying risk assessment, under current conditions or climate change scenarios, or effectiveness of the control
							Under current conditions				Under the most likely climate change scenarios: + means increased risk - means decreased risk = means the same risk		
							L=Likelihood; S=Severity; R=Risk						
Sanitation step	Hazardous event	Hazard	Exposure Groups	Number of persons at risk	Description of existing control	Validation of control	L	S	Score	R	Drought	More intense precipitations	

Notes:

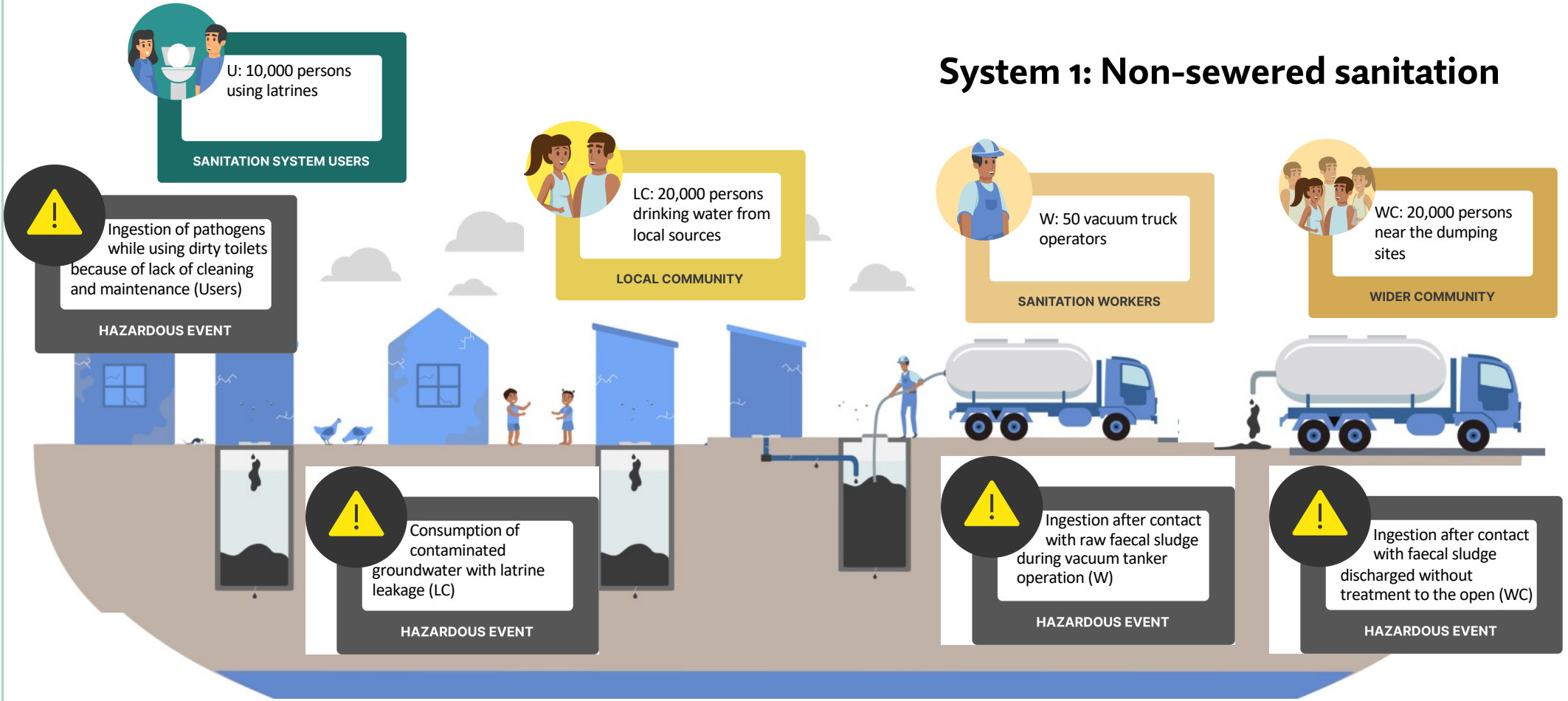
6

World Health Organization

Group Exercise

Group Work

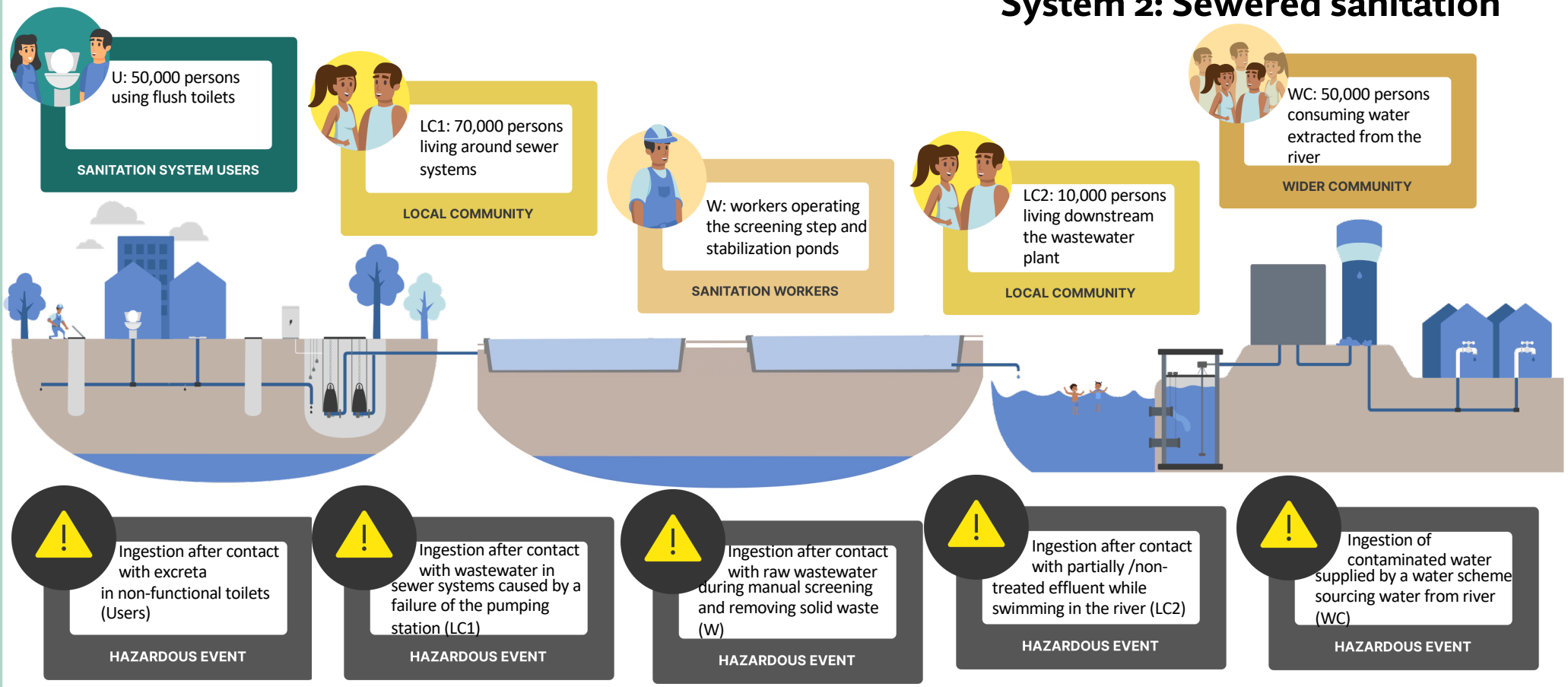
In breakout rooms, you will conduct a risk assessment



Group Work

Group Exercise

System 2: Sewered sanitation



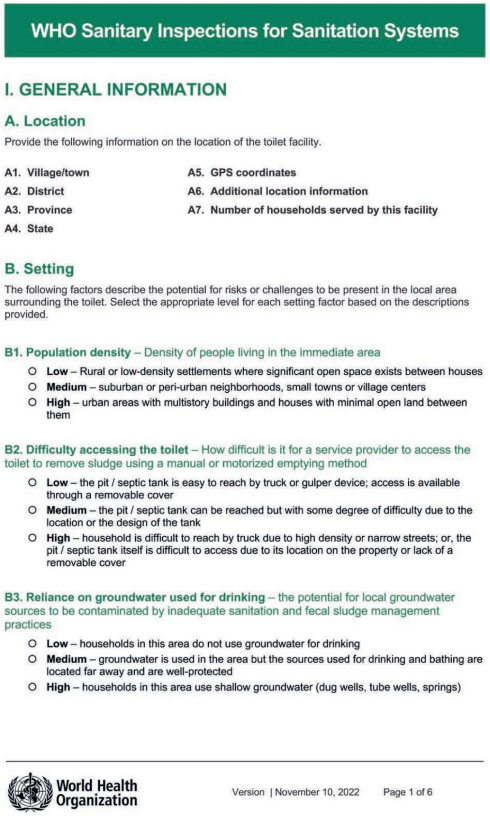
Group Exercise

Back to plenary

Let's discuss

- What do you think is needed to perform a health risk assessment?
- Are utilities in your country familiar with this methodology?

Sanitary inspection forms – simplified assessments



WHO Sanitary Inspections for Sanitation Systems

I. GENERAL INFORMATION

A. Location

Provide the following information on the location of the toilet facility.

A1. Village/town
A2. District
A3. Province
A4. State
A5. GPS coordinates
A6. Additional location information
A7. Number of households served by this facility

B. Setting

The following factors describe the potential for risks or challenges to be present in the local area surrounding the toilet. Select the appropriate level for each setting factor based on the descriptions provided.

B1. Population density – Density of people living in the immediate area

- **Low** – Rural or low-density settlements where significant open space exists between houses
- **Medium** – suburban or peri-urban neighborhoods, small towns or village centers
- **High** – urban areas with multistory buildings and houses with minimal open land between them

B2. Difficulty accessing the toilet – How difficult is it for a service provider to access the toilet to remove sludge using a manual or motorized emptying method

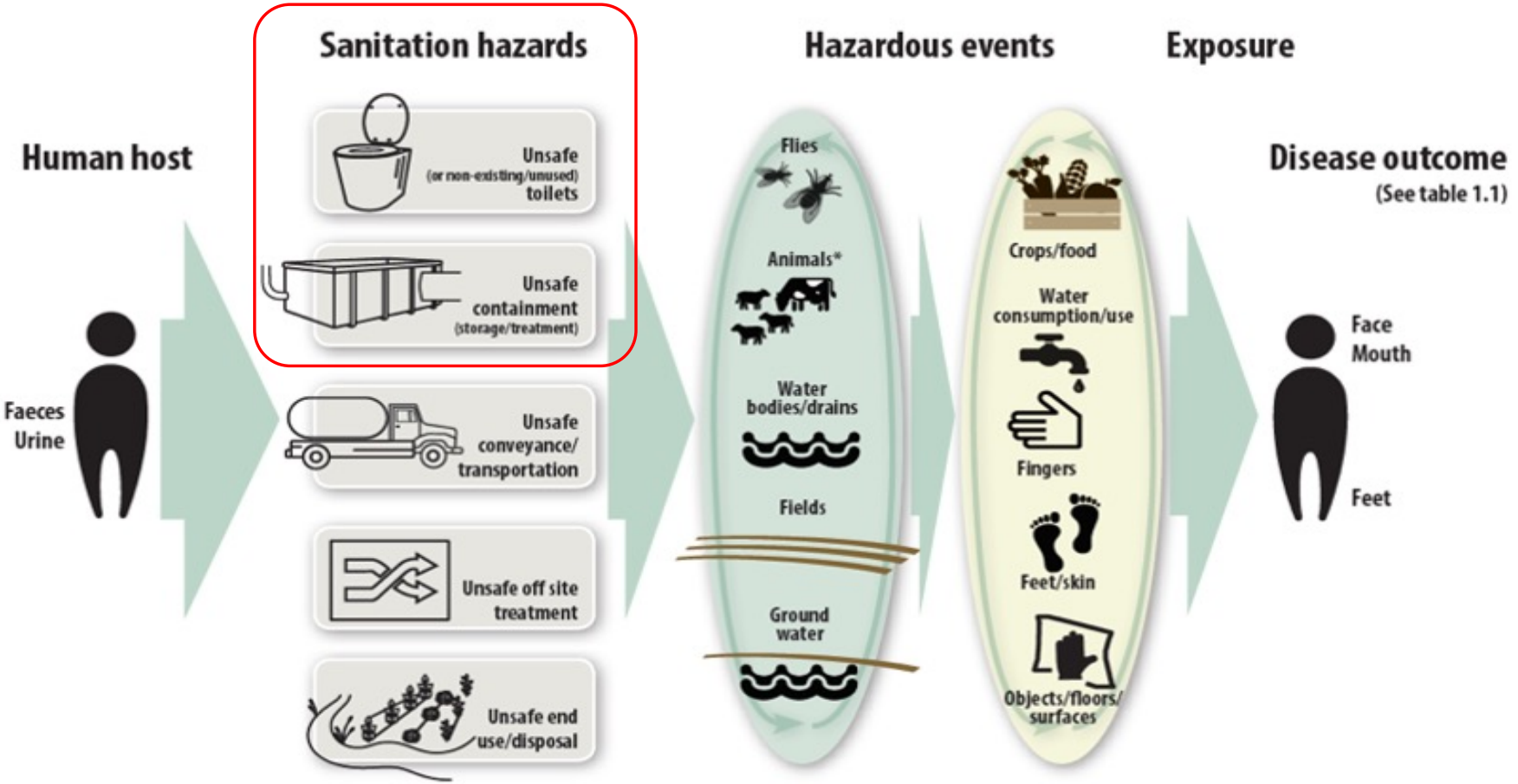
- **Low** – the pit / septic tank is easy to reach by truck or gulper device; access is available through a removable cover
- **Medium** – the pit / septic tank can be reached but with some degree of difficulty due to the location or the design of the tank
- **High** – household is difficult to reach by truck due to high density or narrow streets; or, the pit / septic tank itself is difficult to access due to its location on the property or lack of a removable cover

B3. Reliance on groundwater used for drinking – the potential for local groundwater sources to be contaminated by inadequate sanitation and fecal sludge management practices

- **Low** – households in this area do not use groundwater for drinking
- **Medium** – groundwater is used in the area but the sources used for drinking and bathing are located far away and are well-protected
- **High** – households in this area use shallow groundwater (dug wells, tube wells, springs)

It is a short-standardized observation checklist that can be adapted and used to assess risks and identify appropriate remedial actions to meet SMS definitions and protect public health.

SANITARY INSPECTION FORMS



Source: Guidelines on sanitation and health. Geneva: World Health Organization, 2018

BENEFITS

- ☑ User friendly – can be used by non-specialists
- ☑ Easy and quick hazard identification
- ☑ Suitable with limited amount of time and resources
- ☑ Can be easily adapted to different contexts

LIMITATIONS

- ⓧ Limited number of questions
- ⓧ Risks below ground and inside containment are not easily observed
- ⓧ Assumes every risk has an equal value
- ⓧ Requires adaptation to local context

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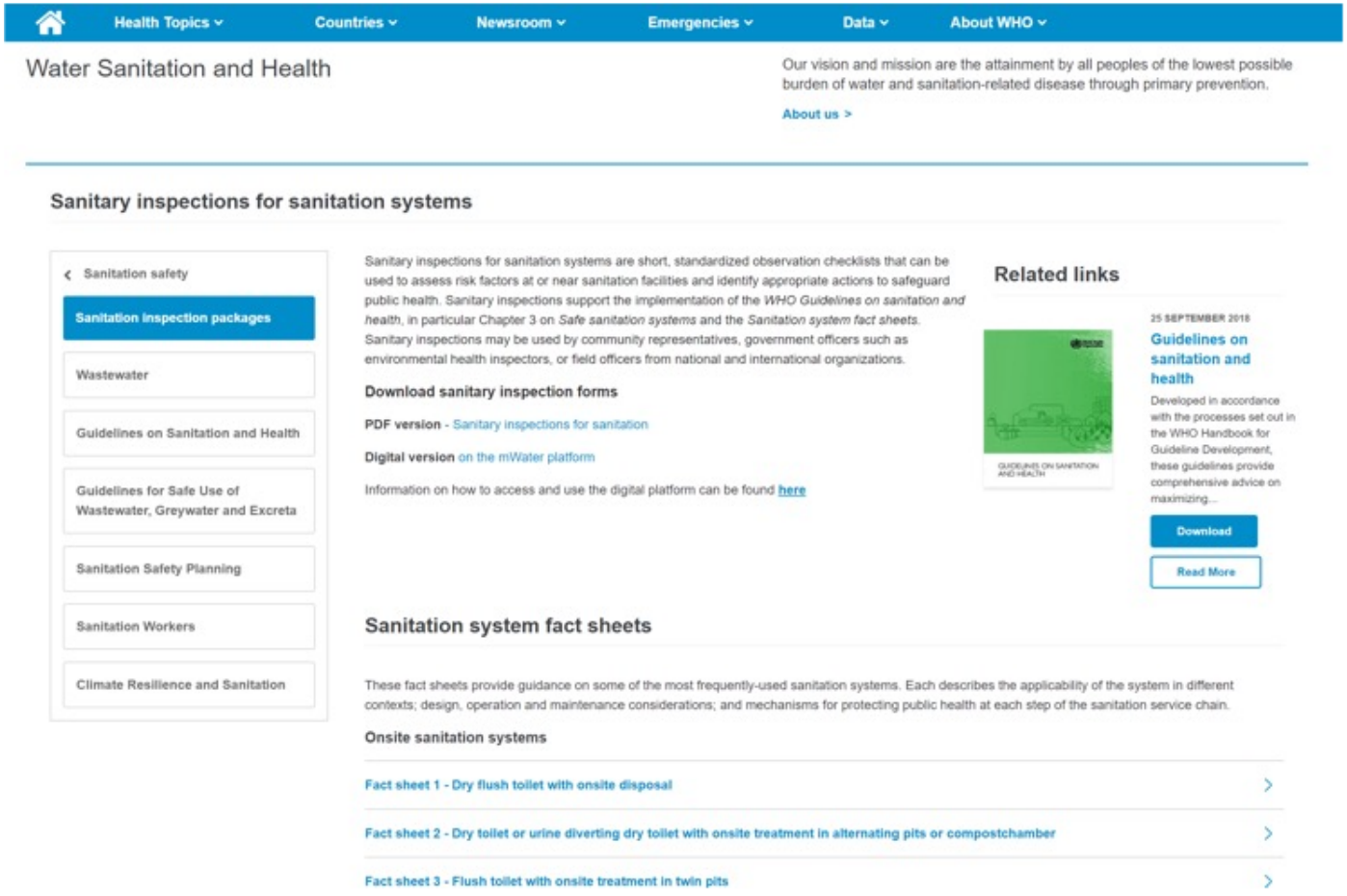
FORMS AVAILABLE IN PDF AND ONLINE (M-WATER)



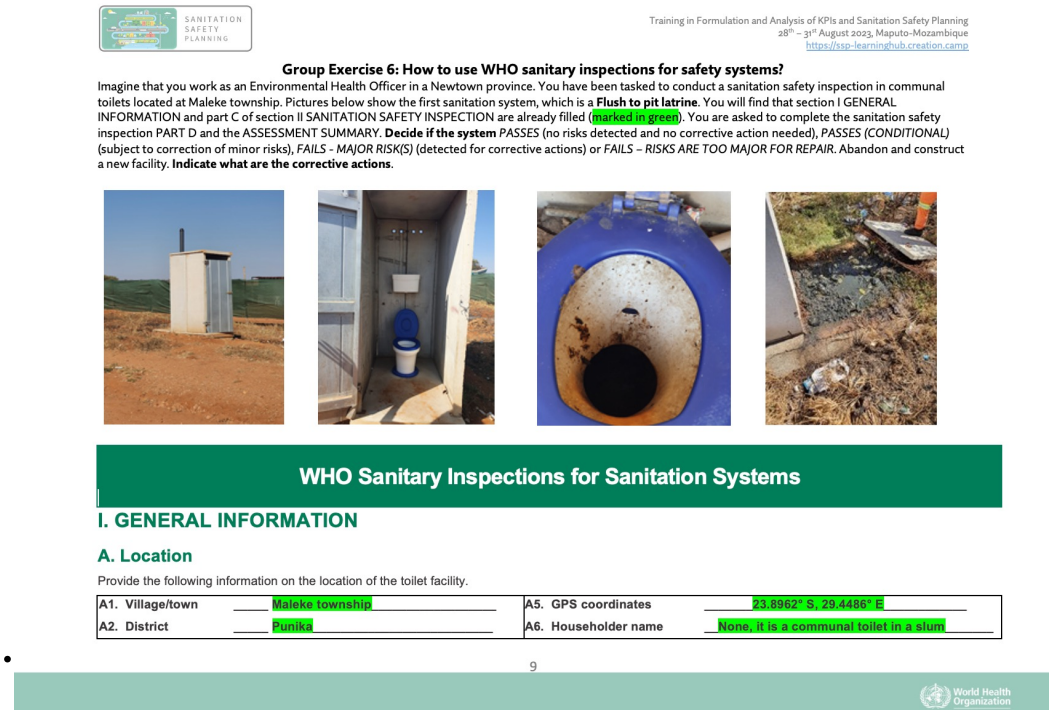
World Health Organization

Group Exercise

Group Exercise 6

You will use the WHO Sanitary Inspections for Sanitation Systems

- Go to page 9 of your worksheets – Group Exercise 6.
- You will find a WHO Sanitary Inspection for Sanitation System partially completed.
- Go through the Inspection Form to understand its content.
- Complete the sanitation safety inspection PART D and the ASSESSMENT SUMMARY.
- Decide if the system PASSES, PASSES (CONDITIONAL), FAILS - MAJOR RISK(S) or FAILS – RISKS ARE TOO MAJOR FOR REPAIR.
- Indicate what are the corrective actions.



SANITATION SAFETY PLANNING

Training in Formulation and Analysis of KPIs and Sanitation Safety Planning
28th – 31st August 2023, Maputo-Mozambique
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Group Exercise 6: How to use WHO sanitary inspections for safety systems?

Imagine that you work as an Environmental Health Officer in a Newtown province. You have been tasked to conduct a sanitation safety inspection in communal toilets located at Maleke township. Pictures below show the first sanitation system, which is a **Flush to pit latrine**. You will find that section I GENERAL INFORMATION and part C of section II SANITATION SAFETY INSPECTION are already filled (marked in green). You are asked to complete the sanitation safety inspection PART D and the ASSESSMENT SUMMARY. **Decide if the system** *PASSES* (no risks detected and no corrective action needed), *PASSES (CONDITIONAL)* (subject to correction of minor risks), *FAILS - MAJOR RISK(S)* (detected for corrective actions) or *FAILS – RISKS ARE TOO MAJOR FOR REPAIR*. Abandon and construct a new facility. **Indicate what are the corrective actions**.

WHO Sanitary Inspections for Sanitation Systems

I. GENERAL INFORMATION

A. Location

Provide the following information on the location of the toilet facility.

A1. Village/town	Maleke township	A5. GPS coordinates	23.8962° S, 29.4486° E
A2. District	Punika	A6. Householder name	None, it is a communal toilet in a slum

9

World Health Organization

Group Exercise

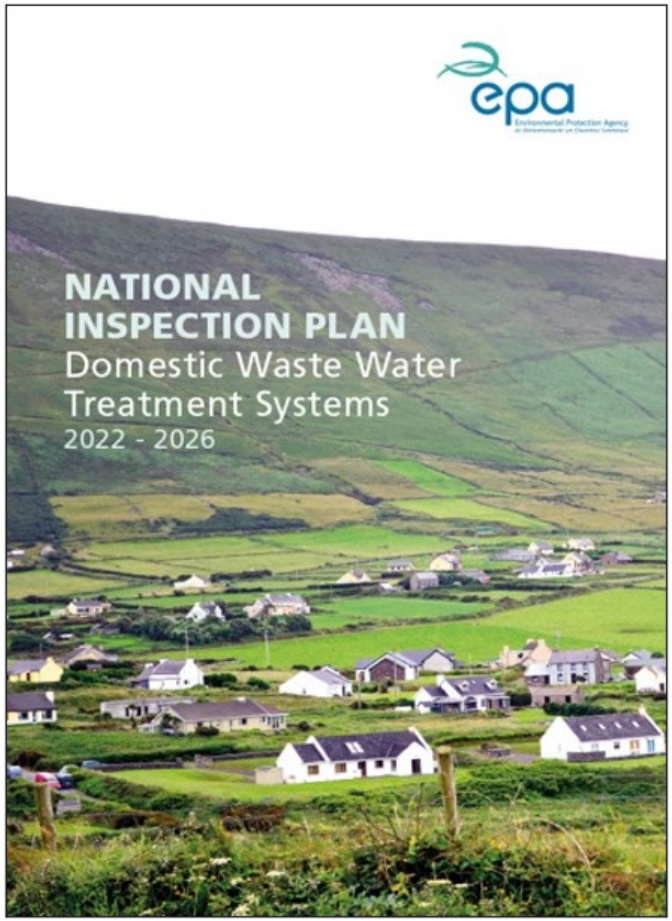
Back to plenary

Let's discuss

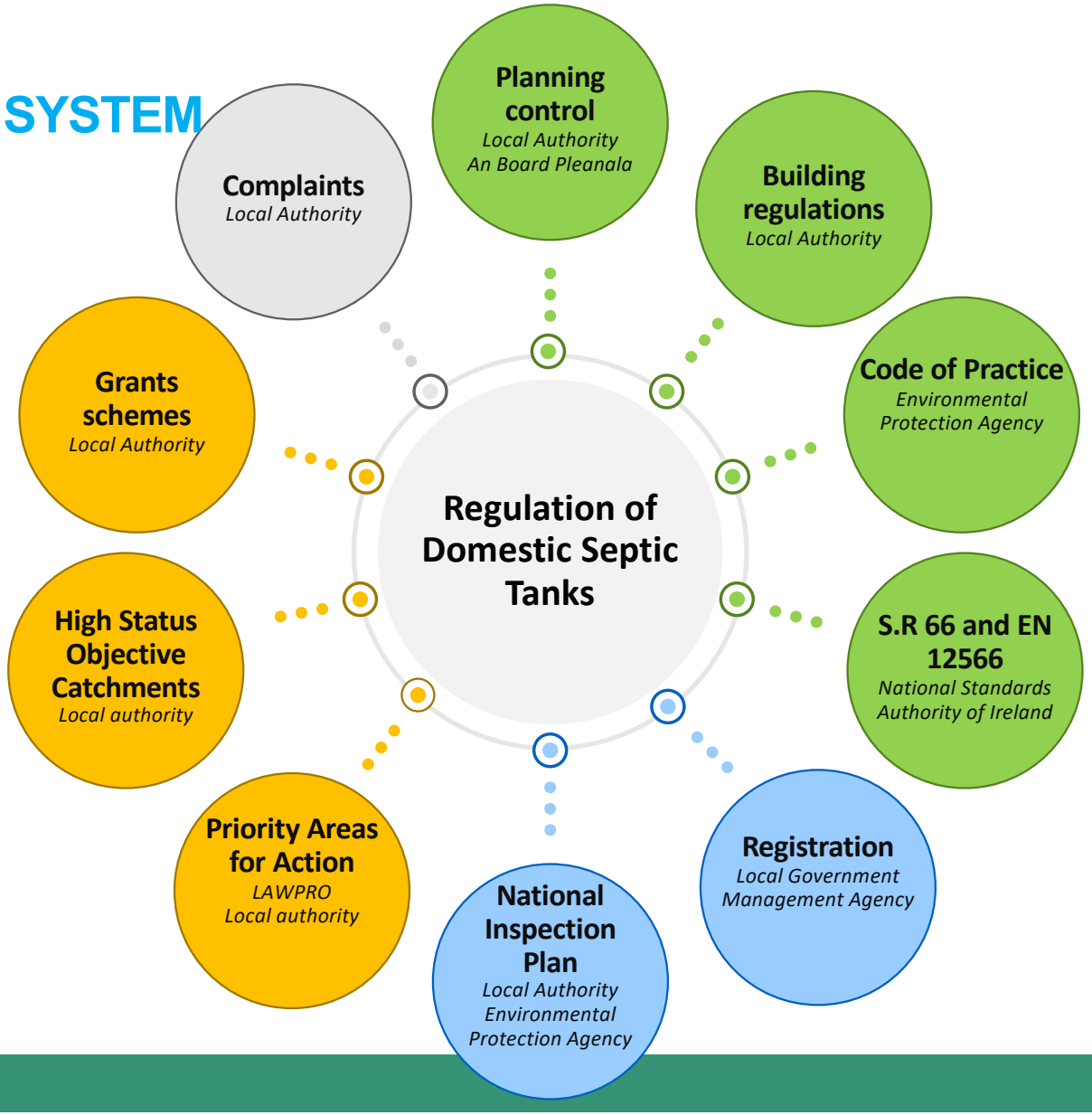
- When to use sanitary inspections? When to use semi-quantitative health risk analysis?

Bonus track

AN EXAMPLE OF REGULATORY USE OF SANITARY INSPECTIONS IN IRELAND



REGULATORY SYSTEM



LEGISLATION

- **Water Services (Amendment) Act 2012**
- Registration Regulations (S.I. No. 220 of 2012)
- Registration (Amendment) Regulations (S.I. No. 180 of 2013)
- **Domestic Waste Water Treatment Systems Regulations (S.I. No. 223 of 2012)**
- Domestic Waste Water Treatment Systems (Financial Assistance) Regulations (S.I. No. 222 of 2013)
- Appointment Regulations (S.I. No. 384 of 2012)
- Reinspection Regulations (S.I. No. 189 of 2013)
- Commencement Order (S.I. No. 219 of 2012)
- **Housing Financial Assistance Regulations (S.I. No. 184 of 2020)**
- **Housing Financial Assistance for Prioritised Areas for Action Regulations 2020 (S.I. No. 185 of 2020)**
- **Housing Financial Assistance for High Status Objective Catchment Areas Regulations 2020 (S.I. No. 186 of 2020)**

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INSPECTIONS - RESPONSIBILITIES

Owner

- Register by 01/02/2013.
- Comply with regulations.
- Ensure system is not a risk to 'human health or the environment'.
- Don't refuse, obstruct, impede, mislead, fail to comply.

Water Services Authority (i.e. Council)

- Take and maintain registrations (protectourwater.ie).
- WSA inspectors conduct inspections.
- Enforce findings, advisory notices etc.

EPA

- Appoints inspectors.
- Issues the National Inspection Plan.
- Supervises WSAs.

INSPECTIONS - KEY TECHNICAL REQUIREMENTS

- Regulation 2(1) Not emit, discharge, seep, **leak** or escape…other than as designed/intended, or under discharge licence, or on to the ground.
- Regulation 2(2) **Roof water** or surface water run-off shall not enter…
- Regulation 2(3) **Parts and components** are fit for purpose, operational where appropriate and kept in good order and repair...
- Regulation 3(1) **De-sludged** at intervals appropriate to the tank capacity and the number of persons resident…or as recommended by manufacturer.
- Regulation 3(2) De-sludging…by an **authorised contractor**.
- Regulation 3(3) **Keep receipt** for five years.
- Section 70C(b) Ensure the system is **not a risk to human health or the environment**…does not:
  - Create a risk to water, air or soil, or to plants and animals,
  - Create a nuisance through noise or odours, or
  - Adversely affect the countryside or places of special interest.

INSPECTIONS:
NATIONAL INSPECTION PLAN

1,000 inspections/annum minimum (1,200 from 2023)

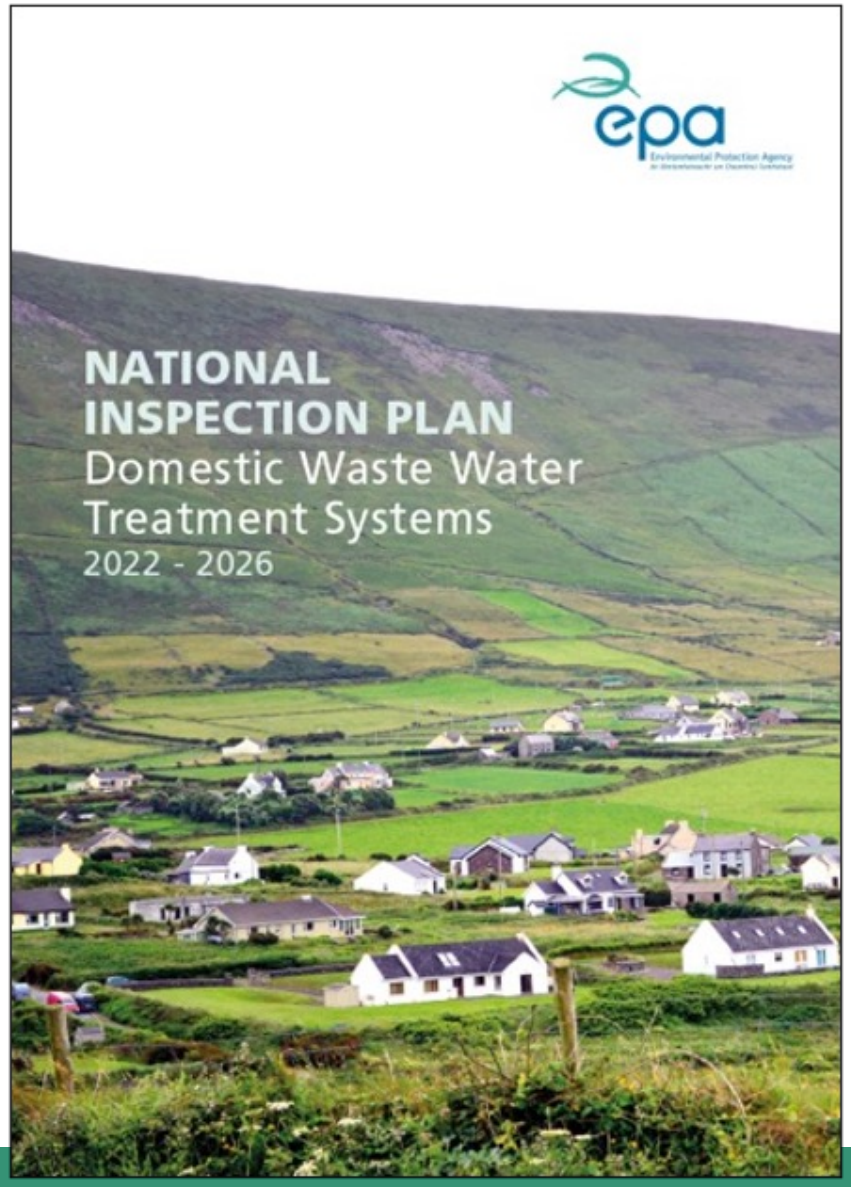
2013-2014

2015-2017

2018-2021

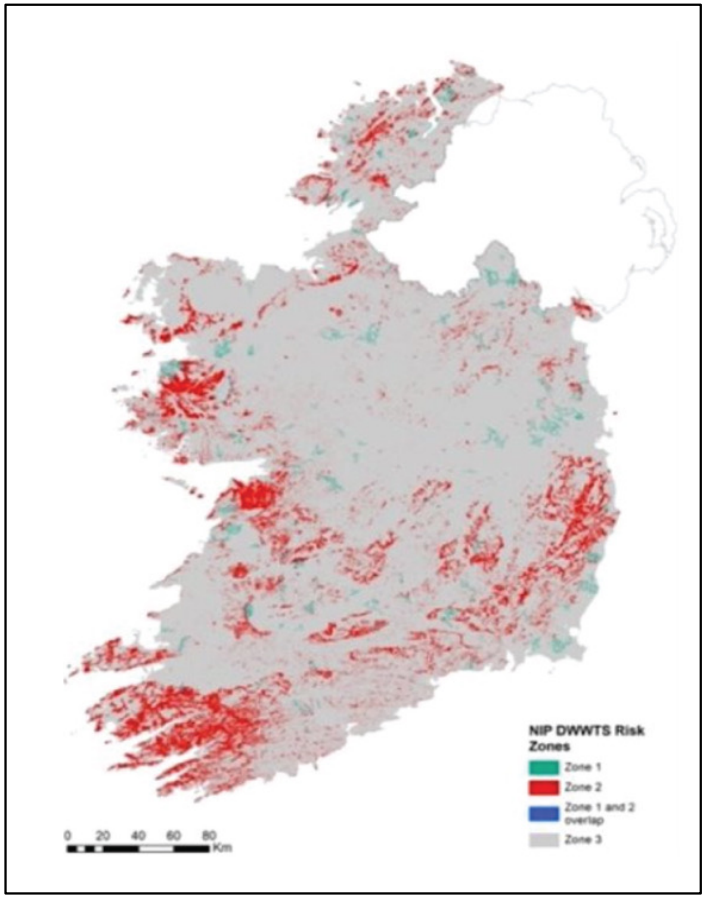
2022-2026

- More where evidence DWWTS are causing an issue
- Focused close to rivers and areas with shallow soils and drinking water wells



INSPECTIONS - NATIONAL INSPECTION PLAN

	Inspections 2022–2026				Minimum in 2022	Minimum per annum 2023–2026
	Zone 1	Zone 2	Zone 3	Total		
Carlow	0	72	15	87	15	18
Cavan	62	68	30	160	28	33
Clare	158	259	40	457	77	95
Cork City	34	9	5	48	8	10
Cork County	106	446	105	657	113	136
Donegal	379	54	85	518	90	107
Dún Laoghaire-Rathdown	0	9	0	9	1	2
Fingal	53	0	10	63	11	13
Galway City	0	5	0	5	1	1
Galway County	202	216	90	508	88	105
Kerry	110	115	60	285	49	59
Kildare	67	14	40	121	21	25
Kilkenny	43	178	25	246	42	51
Laois	0	29	20	49	9	10
Longford	0	5	15	20	4	4
Louth	0	34	25	59	11	12
Mayo	139	58	60	257	45	53
Meath	183	77	45	305	53	63
Monaghan	149	28	20	197	33	41
Offaly	14	5	20	39	7	8
Roscommon	30	5	30	65	13	13
Sligo	5	9	20	34	6	7
South Dublin	0	15	5	20	4	4
Tipperary	87	57	50	194	34	40
Waterford	14	77	25	116	20	24
Westmeath	5	5	25	35	7	7
Wexford	350	221	55	626	106	130
Wicklow	62	177	25	264	44	55
Total	**2400**	**2400**	**1000**	**5800**	**1000**	**1200**



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An Ghníomhaireacht um Chaomhnú Comhshaoil

INSPECTIONS – INSPECTION PROCESS

What to expect

- No rainwater or clean surface water entering
- No leaks
- No ponding
- No unauthorised discharges
- Components in working order
- Proper maintenance and operation
- De-sludging
- Not a risk to human health or the environment

Inspectors

- Training course for WSA staff
- 100 approx. inspectors nationally

Environmental Protection Agency

INSPECTIONS – REMEDIATION AND GRANTS

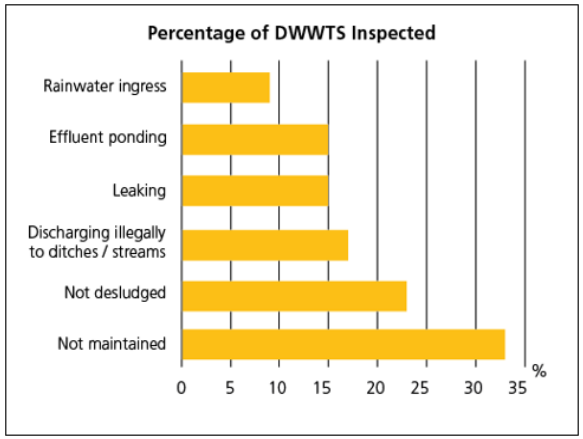
Advisory notice with actions and timeframes

Grants

- High Status Objective Areas
- National Inspection Plan
- Priority Areas for Action

Year	Grants	€
2014	29	€ 98,575
2015	85	€ 256,559
2016	72	€ 212,000
2017	56	€ 179,433
2018	83	€ 289,499
2019	160	€ 497,719
2020	112	€ 388,983
Total	597	€ 1,922,768

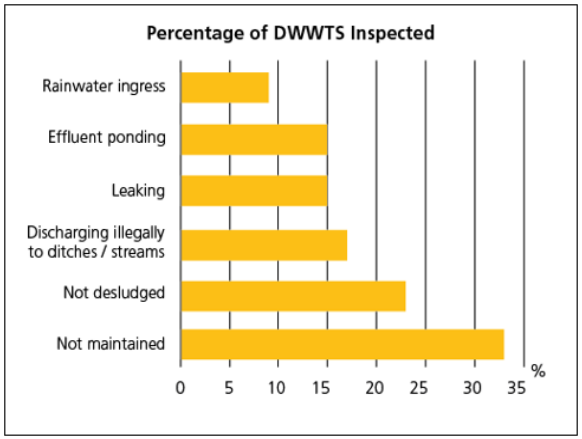
INSPECTIONS - 2021 FINDINGS



- Domestic Waste Water Treatment Systems Inspections 2021 report
- 3,386 (75%) failing systems fixed (2013-2021)
- 1,147 inspections; 604 (53%) failed (2021)

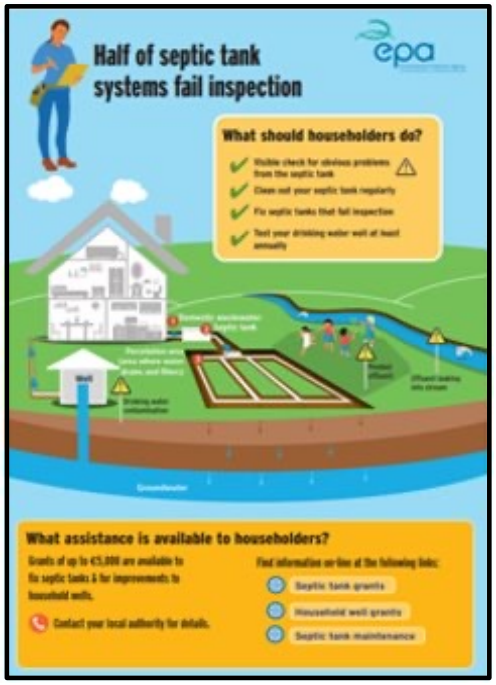
epa Environmental Protection Agency

INSPECTIONS - 2021 FINDINGS



- 36 legal actions (2013-2021)

ENGAGEMENT



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https://www.epa.ie/environment-and-you/waste-water/

What did we achieve today?

- Understand and appreciate Sanitation Safety Planning.
- Understand the methodology and key steps of Sanitation Safety Planning.
- Know how to use the WHO Sanitary Inspections for Sanitation Systems.

Modules 1 to 3

Modules 4 to 6

- Identify which are the requirements for successful implementation of SSP.
- Learn about previous action plans to rollout Sanitation Safety Planning (SSP) in the region.
- Be able to communicate about Sanitation Safety Planning to their target audience.

Tomorrow

Thank you very much!

We will meet tomorrow at 8:30 am!